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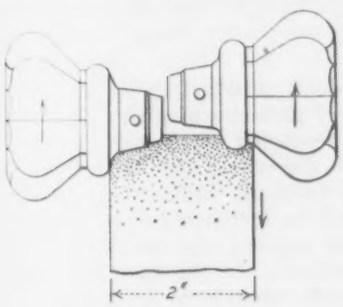
Polishing of Metals an Art in Itself*

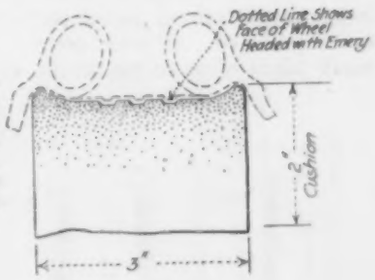
Lack of Standards Attributed to Lack of Appreciation of What the Problem Means—Major Importance of the Lowly Glue Pot

BY SIDNEY G. KOON

WITH the start of the nickel plating industry, about 1876, began the real need for giving metals a polished or refracting finish which would take from them the crude, rough appearance left by the preliminary processes and develop their inherent beauty. From small beginnings, the business of polishing and highly finishing metals has grown in a cumulative manner, and has lately received a considerable impulse from the disinclination of buyers to purchase materials which lack such a finish.



Polishing Two Brass Door Knobs on One Specially Shaped Compress Canvas Wheel. The knobs revolve while being finished



Special Faced 16-In. Compress Canvas Polishing Wheel of Hard Density, Used in Finishing Scissor Handles. The sketch shows how the emery heading fits the wheel contour

Manufacturers, feeling this condition of affairs through the inability of their sales departments to maintain an adequate volume of sales, have not been slow to learn the cause, and to look about for means of giving their products a satisfactory luster. Where they have succeeded in this effort, they have been able in many cases, during the prevailing depression, to hold their customers and add new ones, and to preserve a better proportion of their sales than have their less fortunate neighbors.

This element of sales resistance is centered ultimately very largely in women, who want everything in the household bright and shiny. This attitude applies not only to kitchen utensils, but to doorknobs and other house hardware and a multitude of other things which formerly were left dull. The finely polished nickel-plated electric iron, as compared with the rough black flat iron of a generation ago, is a familiar example.

Grinding with a solid wheel of emery or other abrasive has been used for a long time as a shaping or finishing operation. While this leaves a finish far superior to that left by the lathe or planer tool, it must be regarded merely as a stepping stone or preliminary operation to the real finishing or polishing processes.

Polishing may be regarded primarily as flexible grinding, in that it is accomplished by means of emery or other abrasive held by glue on the periphery of a flexible wheel, made usually of cloth or leather. Buffing, on the other hand, while done with tripoli-rouge, lime or other abrasive powder, and producing the most highly finished product possible, does not have the abrasive firmly attached to the wheel. In buffing the abrasive is applied during the process by means of a "cake," using wax or grease as a body or bond, and held to the wheel, whence it is transferred to the part being treated. It is thus rubbed in by the application of the buffing wheel.

There has long been much confusion in connection with these treatments; many people call them indiscriminately by either name. Hence, it is perhaps not strange, in view of the recent development of the processes, and the utter lack of general information about them, that encyclopedias, even those devoted primarily to mechanical subjects, do not clear up the matter. The paucity of written information in this field is extreme. There is no book dealing adequately with it, nor are there many magazine or other technical articles which cover it, except in fragmentary form.

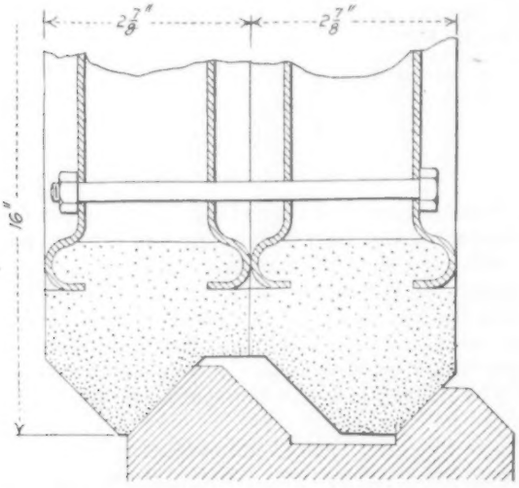
An idea of the importance of polishing operations to the metal working industry may be obtained when it is realized that about 85 per cent of the cost of making pocket knives is represented in the finishing operations. This leaves only 15 per cent for the material, the forging, grinding and other

*Prepared from an interview with Bradford H. Divine, president Divine Brothers Co., Utica, N. Y.

ONE man calls it "buffing"; another says it is "polishing"; still a third refers to "flexible grinding." Confusion of terms implies lack of standards. Lack of standards connotes —in many plants—lack of interest. And lack of interest is the forerunner to loss of profits. When five-sixths of the entire production cost of a pocket knife is incurred in the finishing operation, up-to-date management realizes that that finishing operation deserves the most expert attention and painstaking skill which money can buy. It demands equipment properly fitted, in all its details, to the particular operation to be done on that particular job.

processes. Due doubtless to a lack of realization of its importance, the polishing operation of the usual metal working plant has been neglected to such an extent that this has been characterized as the one department of modern plants which is not run in accordance with modern engineering methods.

The beginning of the importance of polishing was simultaneous with the advent of the nickel-plated bicycle, which was followed almost immediately by nickel-plated faucets and other plumbing fixtures. From this starting point, the process has passed to a myriad of uses, until to-day a very large proportion of metal parts for final use have to be polished. It may seem a far cry from the small blade of a pocket knife to a locomotive bell,



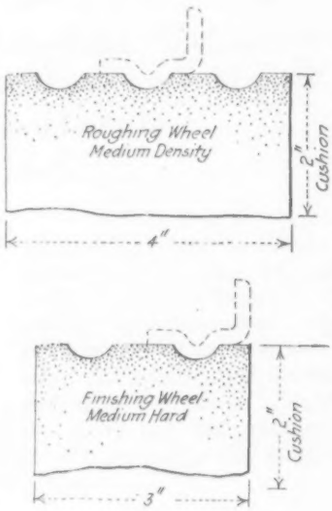
Special Compress Polishing Wheel for Finishing Simultaneously Two Parallel Surfaces on a Lathe Guide The two other inclined parallel surfaces may likewise be finished simultaneously with this same wheel, merely by changing the setup. Note that the wheel consists of annular rings, held in place by special clamps and bolts

but both are now treated largely in the same manner, under modern methods.

Solid grinding does not produce a truly finished surface except in some forms of high precision work. Even then, the rigidity of the abrasive wheel is likely to produce scratches on the surface. Carborundum crystals are prone to dig in. These troubles are avoided when flexible grinding is used, because of the smooth running of the wheel and because the mere property of flexibility in the wheel prevents the resistance to its passage across the part being finished from becoming sufficient to cause scratches.

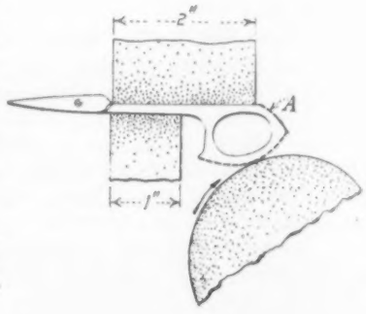
Engineers, who have given this subject of polishing practically a lifetime study, hold positively that the entire proposition of abrasive metal-finishing processes, from whatever angle considered, gets back eventually to the character and quality of the glue used in tying the abrasive to the wheel, and to the method and care by which the glue is applied to the wheel.

It is perfectly obvious that the glue must hold the abrasive particles tightly in position, for it is



Special Angles for Use in Construction of Rheostats Are Polished on Two Wheels, One Following the Other. Both are special 14-in. diameter compress leather wheels. The roughing wheel, of medium density, has three grooves; the finishing wheel, medium hard, has but two. This is on the theory that the abrasive on the rougher operation will wear away more quickly; hence the wheels were designed for an equal amount of service before redressing

quite impossible to do a satisfactory polishing or flexible grinding job if particles of glue and emery fly from the rapidly revolving wheel onto the floor. And the resultant of the wheel and its peripheral velocity must give a hardness sufficient to cut the metal, or the cost will be increased, a satisfactory production volume not reached and the desired finish or luster not obtained. At the same time, the glue has to be flexible enough to bend slightly,



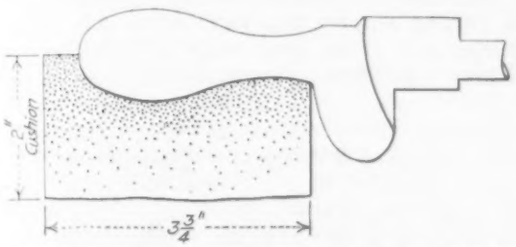
Two Wheels with Plain Contour Polish Simultaneously the Edges of the Handle Stem of the Scissor Blade, the Blade Being Held in a Suitable Jig. The third wheel, shown in a different plane, is used to polish the edge of the handle, as indicated by the dotted line *A*

otherwise the wheel ceases to be flexible and the process approaches that of solid grinding. These two functions of the glue, seemingly almost diametrically opposed, can readily be obtained in a glue manufactured especially for this purpose in accordance with standard formulas. They are almost certain, however, not to be obtained from the general-purpose glues on the market.

Grinding, polishing and buffing are all alike in the fact that they are all performed with wheels. Beyond that point, they differ materially and each in itself has differences due to the character of

the work to be done. For instance, coarse grinding is used for removing scale and humps from the surface of the metal. Medium grinding carries the process one step further and reduces the surface to a certain degree of smoothness. Fine grinding is used for precision work and for leaving a perfectly smooth surface for the following operations. There is no definite dividing line between these three designations of coarse, medium and fine, for there are many grades of fineness of abrasive wheels from the coarsest to the finest.

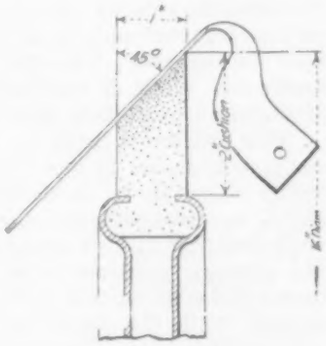
Similarly, polishing may be classified about in the same way as grinding, into coarse, medium and fine, the coarse and medium being similar in the results desired to the coarse and medium grinding. Fine polishing, sometimes called glazing, grease polishing, etc., is used to prepare on non-ferrous metals a surface which will later be buffed or plated.



Shaped Compress Canvas Wheel, 12 In. in Diameter and of Medium Hard Density, Used in Finishing Gear Box Handles. The handle rotates at a speed different from that of the polishing wheel

The final and finish polishing, when applied to bare steel, is often called buffing.

Buffing may also be divided into three groups, coarse buffing consisting in cutting down non-ferrous metals, this operation being done often direct on the casting as it comes out of the sand. Fine or medium buffing follows the rougher process and produces a smoother finish, which may later be carried further. The final or finest buffing process, known as coloring, is used to produce high light



To Get Up Into the Goose-Neck Section of a Hoe Blade, an Acute Angle Is Needed on the Edge of the Wheel. This is a special compress composition wheel

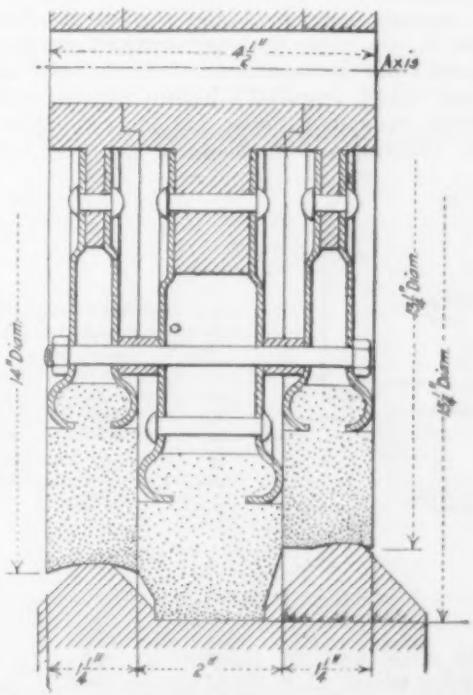
refracting surfaces on either bare metal or plated ware.

Polishing is governed first by the character of the metal being treated. A second governing point, and furnishing a sub-division within each class of metal, is the type of article to be polished. The third governing factor is the contour of that article, which governs not only the density of the wheel but the shape of its face. The fourth and final governing characteristic is the finish which it is desired to obtain upon the metal part.

The character of the abrasive to be used depends upon the amount of metal to be removed, resolved into the number of processes necessary, as well as the character of the finish to be laid on the metal. The size of the abrasive depends on the character

WHEN the sales manager finds a competitor cutting into his customers with goods of a superior finish, then is the importance of proper polishing driven home with compelling force. This is purely an executive problem. The engineering and production elements have all been reduced to standards—but not in every shop. Where finishing technique and methods are still left to Tom, in one shop, to Dick and Harry in the others—there is the place for the expert in polishing to advise with the management and show how dollars may be saved, and others earned, through modern methods untrammeled by precedent and inertia.

or fibrous nature of the material being polished, and on the fineness of the surface desired. Whether natural or artificial abrasive is used depends upon the amount of cut required and whether or not the process is designed for a reduction of the metal. Artificial abrasives are used almost wholly in the cutting process, while the softer natural abrasives, with a certain admixture of dirt which it is difficult to remove from them, but which seems to help



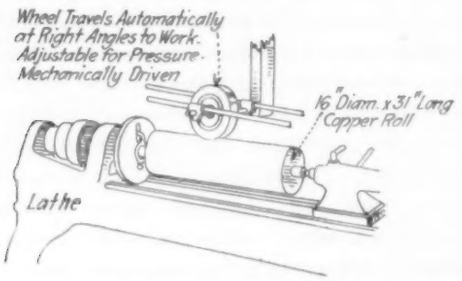
Rough and Dry Finishing on Five Surfaces Simultaneously by Means of Special Sectional Compress Polishing Wheel Designed for This Particular Job

lubricate the process, are used for producing a finish on the surface.

Wheel speed is controlled by the same conditions, and is a matter of greater importance than is generally understood. The limit of operating speeds is controlled by the melting or softening point of the glue used, which action in turn is produced through excessive friction between the wheel and the metal, and through the crushing or glazing of

the abrasive particles. But there is no occasion, in general, to approach this limit. Far lower speeds are called for in many instances than are commonly used and, in these cases, the high speed of usual operation will not produce the finish desired.

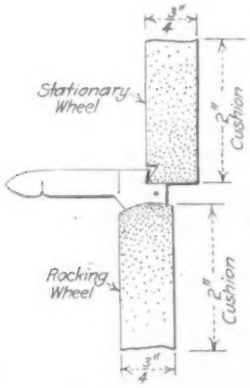
Upon the surface to be covered depends the diameter of the wheel. Its speed depends upon the


Wheel Travels Automatically at Right Angles to Work. Adjustable for Pressure. Mechanically Driven
16" Diam. x 31" Long Copper Roll
Lathe

Because of the Nature of Soft Copper, Which Would Tend to Clog a Polishing Wheel Rotating in the Same Plane as the Engraving Roll, This Concave-Faced Compress Canvas Wheel, with 2-In. Cushion and Extra Soft Density, Has Been Mounted at a Right Angle to the Work. The wheel is 16 in. in diameter, with 4-in. face; the copper roll 16 in. in diameter and 31 in. long

desired results for the several processes necessary to the completed article. The density of the wheel is governed by the shape of the article. The shape of the wheel, that is, whether the face is flat or formed, depends upon the contour of the surface to be polished. Our illustrations show a number of wheels designed for certain specific contours and fitted to those only.

A typical example of the sort of problem to be met in connection with polishing of metals may be drawn from the experience of a prominent optical company, which required a highly polished surface, absolutely true in a plane, for the comparison of lenses. Attempts were made to get this surface



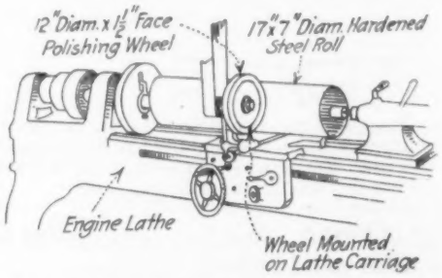
Two Polishing Operations Performed Simultaneously on a Knife Blade by Special Medium Density Compress Leather Wheels 14 In. in Diameter. One wheel has shaped contour; the other, while plain in contour, is undercut to clear the heel of the knife blade

by the usual planing, followed by polishing with a very fine wheel, while the piece was held by clamps upon a planer. Invariably, however, it was found upon removing the piece from the planer that a certain amount of distortion had been set up, by the combined action of the restraining clamps and the heat of the process produced by the passage of the polishing wheel over the surface. Consequently, the familiar rainbows appeared when the plate was used.

In search of better methods of handling the operation, the engineers avoided the use of clamps by holding the piece in place on the planer bed by means of hot pitch, and polishing after the pitch had set. Still the rainbows appeared when a lens was tested. This was due to the fact that the heating of the metal by the action of the wheel produced a local, though minute, heating of the pitch, and so caused the almost microscopic distortion of the metal.

A solution to this problem would be to bring both sides of the metal plate to as nearly as possible a uniform and plane surface, the two being parallel to each other, and then polishing one surface with a polishing wheel while the plate was held by the other surface magnetically on the planer bed. The polishing under this condition can be done with great nicety, care being taken so that the amount of heat previously experienced is considerably diminished. This illustration gives a clear indication as to the character of accuracy required in some polishing operations and as to how this accuracy may be obtained.

In another instance, a firm manufacturing tin foil equivalent to about 1/3000 in. thick only. The final rolling process was done by a roll 7 in. in diameter and 17 in. long, made of hardened steel and highly polished. It was found, however, that



Method of Polishing Hardened Steel Rolls Used in the Manufacture of Tin Foil

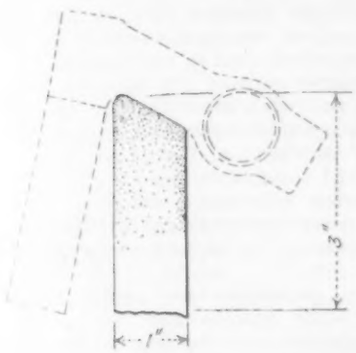
after a few days' work the roll began to give streaks, or tiny scratches, in the surface of the tin foil, which was a condition unacceptable to purchasers. Consequently these rolls had to be changed frequently and redressed before again being used. This redressing was done by a skilled operator, who smoothed the rolls by means of abrasive on a leather surface mounted on a block of wood, and applied by hand to the roll. The operation took him three weeks and, while it resulted in a smooth surface, produced an exorbitant upkeep cost.

This problem is being met by a flexible grinding equipment, shown in one illustration, where a polishing wheel 12 in. in diameter, and with a face of 1½ in., runs back and forth on a lathe carriage while rotating at high speed against the surface of the rotating hardened steel roll. The use of a proper abrasive on this wheel produces the surface desired, while the continuous rotation of the steel roll, on a fixed axis, insures its perfectly cylindrical form after the conclusion of the operation. It is estimated that by this means a roll may be redressed within 30 minutes, instead of requiring three weeks.

Frequently it is necessary, in connection with polishing operations, to go back into the previous history of the manufacture of the article to be polished, and make some change in the manufacturing process so that conditions prejudicial to polishing may be avoided. This study of preliminary processes frequently results in a change in the shape of the piece, so that the polishing may more easily be done. Sometimes this results in the use of a larger amount of metal in the piece, which, of course, is rarely favored by the manufacturer. When it is made clear, however, that the use of an

additional dollar's worth of metal may save ten dollars in the finishing process, the desirability of the change becomes apparent.

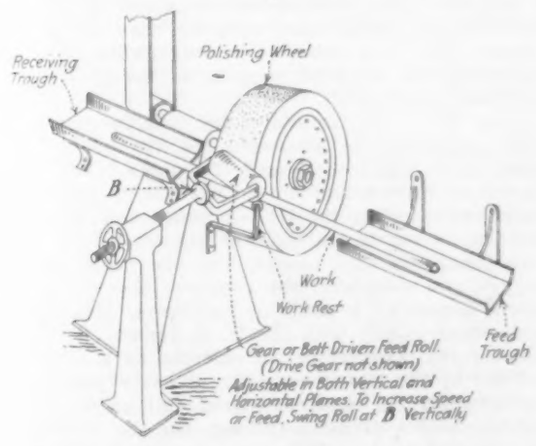
These pages contain a number of sketches show-



To Get into the Angle of a Bicycle Handle Bar Post a Wheel with Beveled Contour Is Necessary. This one is 14 in. in diameter, with 3-in. cushion, of compress canvas and soft density

ing typical polishing processes applied to a great variety of products, all the way from surgical scissors and pocket knives to lathe beds and other heavy pieces. Each one is a problem in itself and each one has to be separately studied. As an illustration of this, mention may be made of skate blanks turned out by a Massachusetts concern. They were cut out by dies from thin plates or sheets of steel. It happened that the manufacturer blanked the blade for the heel risers with one side of the sheet uppermost, while the toe riser was cut with the other side uppermost. The result was a piece so warped that it could not be held on a magnetic chuck, either for removing the burr, by grinding, or for polishing. The remedy was obvious.

The foregoing illustrations may serve to bring clearly to the attention of the executive end of a manufacturing concern the fact that the possibilities of accomplishments, both mechanical and financial, in polishing departments, are fully as large as


Receiving Trough
Polishing Wheel
B
A
Work
Work Rest
Feed Trough
Gear or Belt-Driven Feed Roll. (Drive Gear not shown)
Adjustable in Both Vertical and Horizontal Planes. To Increase Speed or Feed, Swing Roll at B Vertically

Polishing Pipes or Tubes Which Are Fed Across the Face of the Polishing Wheel by the Feed Roll Held Askew

any other department in the factory. The actual polishing processes themselves have been reduced to such absolute standard formulas that they are simple of introduction and execution. The basis of these processes, however, is a general knowledge of all other processes preceding polishing, in order to bring the work through to the polishing or finishing department in such condition that it can be properly operated upon and proper results secured.

It will appeal to the reader, no doubt, that a man who may have spent a lifetime in a plant as a polisher has not had the proper education, experience or training to permit him to do other than simply sit at his polishing wheel and polish a piece of metal. Planning the work requires the best kind of technical training and manufacturing experience. A man, to be a competent executive in charge of a finishing department, should have a thorough knowledge not only of metallurgy, including the effect of various processes, such as heat treating, upon metals, but also of forging, casting, drawing, stamping, spinning, etc. He should have a comprehensive knowledge of the design of metal parts, having in mind the ability of the operator to reach every portion of the article with a polishing or flexible grinding wheel of the size, shape and character necessary to produce the desired finish.

Much could be said on the question of cost of operating finishing departments. It is true that, especially in buffing, the whole plan is so fundamentally loose to-day that enormous wastages, all of which are part of the cost, are present and foolishly so, simply because the proposition in the plant has not been standardized. It is, indeed, difficult to find two concerns, even in the same line of manufacturing, using the same process; and often they are operating at widely different costs. In connection with this, much of the work previously executed, undoubtedly by hand, is now being handled on automatic and semi-automatic machines, with the obvious advantage of decreased cost and increased speed of production.

Shaped wheels are coming rapidly into use, following along the principles of milling machine practice—for what is polishing, except another phase of metal production expressed so clearly in milling operations? Likewise, polishing is taking the place of lathe and planer operations, and, more generally speaking, flexible polishing and grinding are being substituted for other tooling operations at great reduction of cost, and are at the same time producing satisfactory finishes.

Progress in Molding Sand Investigation

The American Foundrymen's Association committee on molding sand research has been formulating instructions to be sent various State surveys as to methods to be followed in their investigations. The sub-committee on standard tests will report in due time on standard methods which will make possible a comparison of sands of one State with those of another. The committee desires information concerning investigations which have been carried on in foundries and laboratories in the testing of molding sand and the reclamation of old sand. The American Steel Foundries, Sivyer Steel Casting Co., Buckeye Steel Casting Co. and Ohio Brass Co. have already offered to contribute the results of tests made in their foundries. Three representatives of the American Society for Testing Materials have been appointed to represent that organization on the A. F. A. committee. They are G. K. Burgess, Bureau of Standards; G. H. Clamer, Ajax Metal Co., and Dr. Richard Moldenke, Watchung, N. J. The secretary of the committee, R. E. Kennedy, 909 W. California Street, Urbana, Ill., would like to be notified of any investigations that are being carried on by foundry companies or individuals.

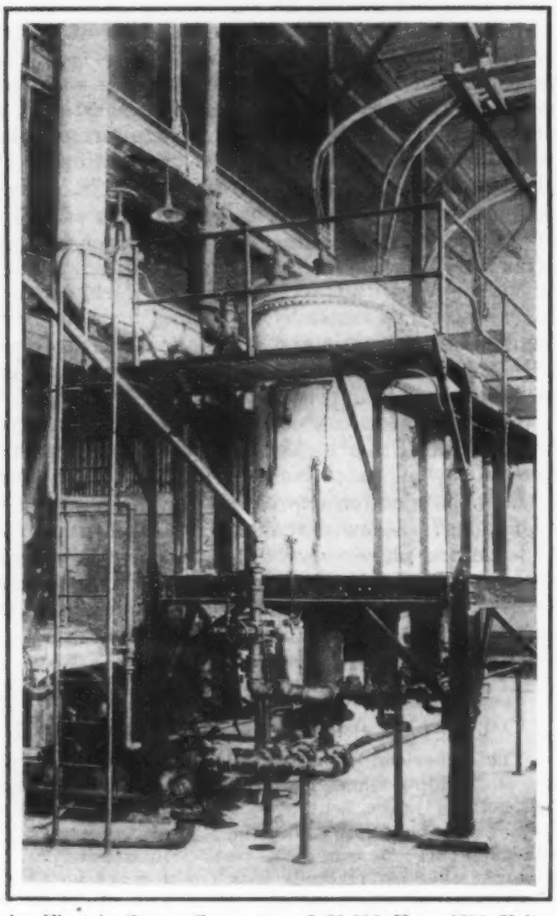
The Pendergast Fence Co., Ltd., Sarnia, Ont., has begun operations in the manufacture of wire fencing. The plant is equipped with new modern machinery. The president is Maurice De Pendergast; vice-president, Archibald Weir; secretary, Judith M. Pendergast, and treasurer, Harvey Unsworth. Maurice De Pendergast started the manufacture of wire fencing in Sarnia in 1903 and the business gradually developed, but has been out of business for a few years preceding the organizing of the new company. He is also president and principal owner of the Pendergast Fence Co., Inc., with head office and a plant at Stillwater, Minn.

ELECTRIC STEAM GENERATOR

An Apparatus to Take the Place of Fuel-Fired Boilers

AN electric steam generator, utilizing the principle of heating produced by resistance to flow of electric current through water, has been placed on the market by the Electric Furnace Construction Co., Philadelphia. It is called the Electro steam generator.

Steam is generated at any specified pressure by means of high tension alternating current led directly



An Electric Steam Generator of 20,000 Kw., 6600 Volts, 3-Phase, Installed by Shawinigan Water & Power Co.

through electrodes of special design into the water to be evaporated. A vertical tank is used, constructed according to approved boiler practice. The whole apparatus occupies, it is emphasized, only a fraction of the space required for fuel-fired boilers and the cost of installation is much less.

The amount of steam generated, the pressure and amount of electric power used are governed by the height of water in the vertical tank. This is controlled and regulated by standard valves, thus to render the whole operation practically automatic.

Any water that is suitable for the ordinary boiler is satisfactory and it is not regarded as necessary to install water softening apparatus. Either condensate or raw water can be used or a mixture of the two. No part of the electric steam generator is exposed to a higher temperature than that of the steam and the only part subject to wear is the electrodes.

The most important application of this steam generator will be found in industries located within the range of hydroelectric power plants, where use may be made of surplus energy or water running to waste. Due to the inability of ordinary power consumers to operate 24 hr. per day, the load factor at most power plants runs from 60 to 80 per cent. Complete use may be made of this off-peak load, which is not now used, by the installation of such steam generators, and the load factor of the power station can be considerably improved. The generators are found to operate with 98 per cent thermal efficiency and unity power factor. The generator can be paralleled in with existing coal or oil-fired boilers and operated on the off-peak loads, when cheap power can be had.

One large installation operates only on Saturday night and Sunday, and the resultant saving in coal, it is stated, paid for the whole cost in one season.

The chief advantages claimed are that the initial and operating costs are much lower than on fuel-fired boilers, the space occupied is much less, minimum expenses involved for buildings, and smokestacks, storage for oil or coal, fuel or ash-handling equipment, mechanical stoking devices and water softeners are not needed. Renewals, repairs, cleaning and shutdowns are reduced to a minimum as the highest temperature is that of the steam.

A number of large generators have been in successful operation for some months and already over 100,000 kw. of generators, representing 10,000 boiler horsepower, according to Frank Hodson, president Electric Furnace Construction Co., are running or being installed of the type described.

Wherever fuel is expensive and power can be had at cheap rates, the electric steam generator is regarded as the economical unit. This condition applies particularly to industries like paper, pulp and chemical, lumber, textiles, etc. Many companies purchasing power contract for blocks of electric power at a fixed rate per horsepower year. Yet few of these use this continuously, it is pointed out, and during idle periods the energy which they pay for can be converted into steam for heating or industrial purposes.

Air Reduction Sales Co. and Davis-Bournonville Co. Merge

The Air Reduction Sales Co., Canadian Pacific Building, New York, and the Davis-Bournonville Co., Jersey City, N. J., have consolidated. Plans which have been under way for several weeks were ratified at a meeting of the stockholders on March 17. New officers of the consolidated company have not yet been elected, nor have complete arrangements been made regarding the physical merging of the plants of the combined companies.

The Air Reduction Sales Co. was incorporated in 1915, acquiring its processes for the production of gases from liquid air largely from the L'Air Liquide Societe of France, and it owns exclusively the rights to these processes for the United States and Mexico. In addition to plants scattered at various industrial centers throughout the country for the manufacture of oxygen and acetylene, the company also markets the entire output of a plant in Baltimore, Md., operated and owned jointly with the U. S. Industrial Chemical Co., for the manufacture of calorene by a process developed by the two companies. It has a plant at Jersey City for the manufacture of cutting and welding torches, and a plant in Chicago for the manufacture of acetylene tanks. It has warehouses in 35 cities of the United States.

The Davis-Bournonville Co., which has a plant at Jersey City, is a pioneer in the development of oxy-acetylene apparatus and equipment, its products including the "Oxygraph," the "Radiagraph," tube welding equipment and other special devices which will be combined with the "Airco" line of the Air Reduction Sales Co.

At the annual meeting of the Engineering Advertisers' Association, held at the Great Northern Hotel, Chicago, March 14, the following officers were elected for the coming year: President, Julius Holl, assistant to president and advertising manager Link-Belt Co., Chicago; vice-president, J. B. Patterson, district manager P. H. & F. M. Roots Co. at Chicago; secretary, H. N. Baum, advertising manager Celite Products Co., Chicago.

Fluorspar in Open-Hearth Practice

Effective Agent in Removing Sulphur from the Steel—Action on the Slag and Furnace Lining—Some Old Ideas Altered

FLUORSPAR has been used in the basic open-hearth process for many years, but very little is known as to the reasons for the effects it brings about. It has been found useful in helping to lower the sulphur in open-hearth heats, and in this connection a paper by S. Schleicher in *Stahl und Eisen*, March 17, 1921, is of great interest, as it deals entirely with this question of desulphurization and the use of fluorspar.

In Table 1 are shown the results with nine heats made from material very low in manganese and high in sulphur, and in the working of which no fluorspar was used. The last column shows the sulphur distribution coefficient and is obtained by dividing the sulphur content in the slag by that in the steel. In other words, it shows the ratio of the sulphur in the slag to that in the steel.

Table 1—Sulphur Contents of Heats Made without Fluorspar

Analysis of Metal					
Carbon, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent	Sulphur in Slag, Per Cent	Distribut'n Coefficient
0.12	0.56	0.04	0.06	0.14	2.33
0.12	0.47	0.03	0.08	0.27	3.37
0.12	0.56	0.07	0.08	0.19	2.37
0.11	0.53	0.05	0.09	0.34	3.77
0.08	0.53	0.04	0.09	0.35	3.90
0.11	0.53	0.06	0.08	0.20	2.50
0.10	0.44	0.04	0.08	0.26	3.25
0.16	0.50	0.03	0.09	0.32	3.50
0.09	0.44	0.04	0.09	0.30	3.33

The distribution coefficient of these nine heats averages 3.15. Table 2 shows what a different result is produced when fluorspar is used and gives the analysis of nine 30-ton heats, as before, using the same lime charge but with addition of 400 kg. (882 lb.) of fluorspar.

Table 2—Sulphur Contents of Heats Made with Fluorspar

Analysis of Metal					
Carbon, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent	Sulphur in Slag, Per Cent	Distribut'n Coefficient
0.10	0.38	0.02	0.05	0.32	6.4
0.13	0.47	0.03	0.05	0.32	6.4
0.08	0.32	0.02	0.04	0.30	7.5
0.17	0.50	0.05	0.06	0.38	6.3
0.15	0.47	0.02	0.04	0.26	6.5
0.13	0.44	0.06	0.05	0.30	6.0
0.12	0.53	0.04	0.03	0.20	6.6
0.12	0.41	0.02	0.05	0.33	6.6
0.12	0.47	0.03	0.06	0.36	6.0

The coefficient of these nine heats is considerably increased and averages 6.5. The steel of the first nine heats averages 0.08 per cent sulphur, which is above the allowable limit of 0.06 per cent, while with the last nine heats it is about 0.05 per cent. The addition of fluorspar brings about a noticeable increase in the distribution coefficient and a decrease in the sulphur in the steel.

The next matter to be investigated is the action of the fluorspar in the slag. After its addition the slag becomes very fluid. If the outgoing gases are conducted through water the well known jelly-like precipitate of silica is formed which is always produced when silicon fluoride is passed through water. The fluorspar has therefore reacted with the silica of the slag, silicon fluoride being given off as a fume, and lime formed according to the equation:

$$2\,CaFl_2 + SiO_2 = SiFl_4 + 2\,CaO$$

As silicon fluoride is formed, the calcium fluoride or fluorspar contents of the slag must decrease. This is shown by the following results, the first sample being taken immediately after solution of the fluorspar; that is, 10 min. after addition, and the other samples at 10-min. intervals. The exact results of sulphur determinations in the steel, and calcium fluoride in the slag, were as follows:

Sulphur, per cent.	0.110	0.076	0.074	0.070	0.063	0.056	0.052
Calcium fluoride, per cent	6.03	4.10	3.40	2.27	2.09	2.21	2.00

This shows that the decrease in calcium fluoride only goes on to about 2 per cent, the samples taken during the last 30 min. agreeing within allowable errors of analysis.

Seven finishing slags from seven heats in which fluorspar was used were then examined. The results were:

Calcium Fluoride, Per Cent	Fluorine, Per Cent
2.58	1.26
2.40	1.17
2.44	1.19
2.30	1.12
2.16	1.05
2.48	1.20
2.06	1.00

Here, also, with sufficiently long working, the calcium fluoride contents of the slag are reduced to 2.0 to 2.5 per cent, and then remain practically constant. Whether the fluorine is all present as calcium fluoride, or in some other form, was not determined, but the assumption was made that it was calcium fluoride.

Up to now it has also been assumed that desulphurization, when fluorspar is used, was brought about by the slag being made more basic and yet remaining fluid enough to permit a good reaction. The following results will show that desulphurization cannot be laid to this cause. The finishing slags of two similar heats, one made without fluorspar additions and the other with fluorspar, are given in Table 3.

Table 3—Open-Hearth Slags with and without Fluorspar

Without Spar				With Spar			
	Slag, Per Cent		Steel, Per Cent		Slag, Per Cent		Steel, Per Cent
SiO_2	15.20	C	0.16	SiO_2	19.63	C	0.12
Fe_2O_3	3.57	Mn	0.50	Fe_2O_3	2.86	Mn	0.41
FeO	8.14	P	0.03	FeO	11.57	P	0.02
Al_2O_3	2.14	S	0.09	Al_2O_3	3.36	S	0.06
MnO	5.41			MnO	5.63		
P_2O_5	4.76			P_2O_5	2.62		
CaO	46.50			CaO	45.98		
MgO	12.97			MgO	4.55		
S	0.32		S. Coeff.	S	0.44		S. Coeff.
$CaFl_2$	...		3.50	$CaFl_2$	2.26		7.3

The basicity of the two slags expressed as the ratio of the oxygen of the bases to that of the acids is 1.67 in the first case, 1.30 in the second, and yet the distribution coefficient in the first case is 3.50 and in the second 7.3.

In order to obtain conclusive information, the following experiment was carried out: A 60-ton heat was taken, and while working down 2000 kg. (4409 lb.) of spiegeleisen was added. In a half hour the manganese was worked out and the bath was in such condition that about a half hour's work with the finishing slag was needed. An addition of 900 kg. (1984 lb.) of fluorspar was made, the spar containing 95 per cent calcium fluoride. Samples of metal and slag were taken, as shown in Table 4. Especially striking is the fact that the silica does not decrease but increases, notwithstanding the calcium fluoride reacts with the silica as shown by the thick white smoke from the chimney after each addition.

To investigate the matter further, samples were taken from another heat giving results as follows:

Test	Time	Silica, Per Cent
1	10:28	17.23
	10:30	800 kg. (1764 lb.) fluorspar
2	10:33	17.05
3	10:37	16.18
4	10:42	17.08
5	11:13	17.70

This heat also shows that the silica drops during the first seven minutes but then again increases. The slag takes up silica which must come from the furnace lin-

ing, and it must be mentioned that there is marked destruction of that part of the hearth and walls coming in contact with the slag. Through the fluorspar addition the slag has not become more basic. The sulphur in the bath (Table 4) is lowered from 0.081 per cent to 0.064 per cent and then 0.060 per cent. In the slag, however, the sulphur is not increased but decreases, and to a greater extent than is accounted for by the dilution of the slag with the spar addition. The same results were shown by another heat as given below:

Time	Sulphur in Steel, Per Cent	Sulphur in Slag, Per Cent
10:55	0.081	0.233
11:00	800 kg. (1764 lb.)	Spar addition
11:20	0.060	0.165
11:40	n. d.	0.182
12:12	0.042	0.220
12:13	Tapped	

A careful balance of the sulphur in the heat given in Table 4 shows that 18.39 kg. (4054 lb.) were volatilized. A test was carried out several times of taking outgoing gas from the furnace between the port and the air regenerator, through a water-cooled pipe, and bubbling through potash solution. The average was 0.064 per cent in the steel and only 0.09 per cent in the slag. Careful calculation showed that 10.8 kg. (23.8 lb.) sulphur had volatilized. The finished metal showed 0.05 per cent sulphur, so the slag had absorbed sulphur again from the metal.

With soft heats, also, it has been found that there might be re-sulphurization but only when spar was added suddenly, in large amounts, to the finishing slag. In these cases there was always such a drop in the sulphur contents of the slag that the total of sulphur in metal and slag was decreased and sulphur was volatilized. In one case, of a 44-ton heat, after the addition of 700 kg. (1543 lb.) of spar there was an increase in the bath from 0.076 to 0.097 per cent, while the sulphur in the slag dropped from 0.385 to 0.016 per cent. Calculation also showed that 18.6 (41 lb.) of sulphur was volatilized. It is evident that such a slag is in good condition to take up sulphur from the bath.

For desulphurization, therefore, it is necessary that, after the fluorspar addition, the heat remain sufficiently long in the furnace. The fear that too early addition of fluorspar is harmful is therefore not true.

*Table 4—Test with Fluorspar Addition**

	Steel				Slag									
Time	Carbon	Mangan.	Phos.	Sulphur	SiO_2	FeO	Fe_2O_3	MnO	CaO	Al_2O_3	MgO	S	P_2O_5	CaF_2
2:15	0.145	0.35	0.026	0.081	19.90	10.80	2.14	17.07	38.80	2.08	6.16	0.21	2.68	...
2:30	0.115	0.32	0.033	0.083	17.90	10.67	2.71	16.77	39.30	3.16	6.35	0.25	2.52	...
2:32					Addition of 2000 kg. (4409 lb.) spiegeleisen									
3:00	0.175	0.44	0.038	0.081	17.85	10.67	1.57	17.28	39.90	2.57	6.85	0.36	2.50	...
3:01					Addition of 900 kg. (1984 lb.) fluorspar									
3:11	0.120	0.38	0.027	0.064	17.60	11.44	1.57	15.83	34.65	2.36	7.29	0.26	2.29	6.34
3:21	0.100	0.33	0.030	0.060	18.05	11.70	2.14	16.25	35.18	1.90	6.65	0.25	2.21	5.25
3:23					Addition of 300 kg. (661 lb.) spiegeleisen									
3:33	0.100	0.35	0.030	0.060	18.25	11.70	2.71	16.02	35.50	2.51	7.15	0.24	2.13	3.49
3:34					Tapped									

*Data in percentages.

showed 0.22 gr. sulphur per cubic meter, and theoretically there should be 0.213 from the producer gas. Similar tests were made after the addition of fluorspar, but this method did not show an increase in the sulphur contents of the gas. This shows the sulphur is not in the form of SO_3, but there is the possibility of a fluoride being present, such as, for example, SFl_6. There is a possibility that such a compound would be precipitated by the low temperature of the water-cooled tube, so the gas was sucked hot through a porcelain tube, and it was found that more sulphur was absorbed. The gas contained 1.966 gr. per cubic meter, and as 0.22 gr. came from the producer gas, the remainder or 1.766 gr. was volatilized from the slag. The amount taken for the test was 10 liters and the time was the seven minutes immediately following the fluorspar addition.

The test showed, therefore, that the influence of fluorspar addition to an open-hearth slag regarding the lowering of the sulphur is that in some form or other the sulphur is volatilized, and the slag is therefore in condition to take up more sulphur from the bath. The last mentioned tests show this clearly, the sulphur contents in the final slag being approximately the same as before the fluorspar addition, although previous to this it decreased. The sulphur in the bath dropped from 0.081 to 0.042 per cent. Where the slag is to be used for fertilizer, and it is necessary the phosphate be soluble in citric acid, fluorspar should not be used.

Next comes an abstract of the paper by J. Fohs in THE IRON AGE, May 27, 1909, p. 1692, with the conclusions of which Mr. Schleicher is not in agreement, as they are contradicted by the results of the tests previously described.

Under certain conditions, notwithstanding fluorspar additions, it is possible to get re-sulphurization of the bath, when there is a very rapid removal of carbon. An example of a 40-ton heat may be mentioned. The heat was very high in carbon and with a very thick slag. Ten minutes after the addition of about 10 per cent fluorspar to the slag, the metal after a good deal of foaming was soft. The sulphur before the spar addition was 0.048 per cent in the steel and 0.34 per cent in the slag. Ten minutes after the addition it

Experience proves that spar can be added with the lime, and it can at least be added while the lime is in lumps in the slag without danger that there will not be plenty of time to take care of possible re-sulphurization. Experience also shows that heats handled with spar are always very low in phosphorus.

The writer draws the following conclusions: If fluorspar is added to an open-hearth slag, it is only decomposed and reduced to a certain limit, namely, from 2.0 to 2.5 per cent calcium fluoride content. Silica is first removed from the slag as silicon fluoride, but this silica is replaced by silica from the furnace lining. Fluorspar is desuphurizing in its action in that sulphur is volatilized from the slag in some form and the slag therefore can take up more sulphur from the bath.

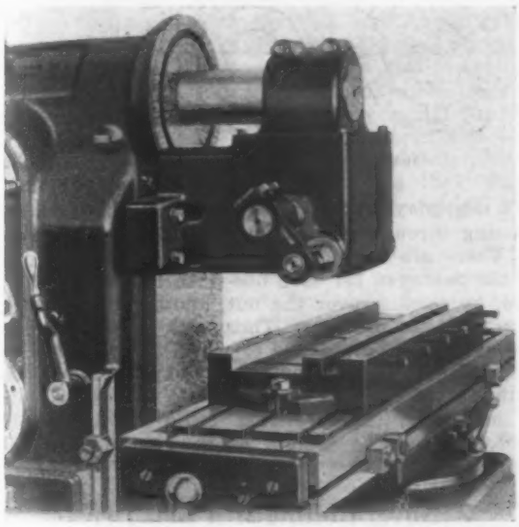
There was an interesting discussion of this paper which was read before the steel works committee of the German Iron and Steel Institute. One speaker mentioned the great danger of using fluorspar because of the deterioration of the furnace walls and port ends. The first result of the spar additions is to give greater fluidity to the slag, greatly increasing its capability for reaction. The whole melting practice is thereby favorably influenced and it may be assumed that the increased removal of sulphur is due to this cause. Mr. Schleicher disputed rapid deterioration of the furnace ends or walls when fluorspar was used, but admitted that the hearth suffered and the dolomite consumption was increased.

Another speaker mentioned that fluorspar burst into fine particles when added to the furnace because of its water of crystallization, and had a very harmful effect on the roof, walls and ends, and on this account was only to be used in the most urgent cases. In reply to another speaker, Mr. Schleicher said numerous cases had proved that after spar additions, the sulphur in the slag first dropped considerably, and that the sum of the sulphur in slag and metal showed a loss in total sulphur, and also a re-sulphurization of the metal in the bath. In regard to the destructive effects of fluorspar, it had not been found that the port ends and roof suffered, but the ladle linings were very rapidly eaten away. It should not be used unless needed, put there were cases where it provided a means for reducing the sulphur in high sulphur heats.—G. B. W.

Rack-Cutting Attachment for Heavy Miller

A new rack-cutting attachment designed especially for the heavy-duty miller has been brought out by the Rockford Milling Machine Co., Rockford, Ill. Rigidity is a feature emphasized by the makers.

As shown in the illustration, the attachment is clamped securely to the face of the column, further support being given by the overhanging arm support immediately above the attachment spindle, at which point the greatest strain is received. This strain is said to be entirely overcome by the method of clamping to the overhanging arm. The drive is by a shank held in the main spindle by the tang and drawback. A wide face hardened spur gear on the shank drives a spur gear keyed to the double-lead worm, the latter being



The Attachment Is Clamped to the Face of the Column, as Shown. Further support is given by the overhanging arm

of alloy steel, supported at both ends and provided with two ball end-thrust bearings. The worm drives a heavy bronze worm wheel of coarse pitch which has keyed to it, one on either side, two spur gears of wide face and with staggered teeth. These spur gears drive two gears that are cut solid on the attachment spindle, one very close to the front, the other to the rear bearing. The wide face gears with staggered teeth are intended to assure smooth drive.

The attachment spindle is of special alloy steel and runs in bronze taper bearings which are provided with means for taking up wear through the adjustment of a single nut. The solid shaft on which the two spur gears and worm wheel are mounted extend through the attachment to serve as an over-arm support for the cutter arbor. The worm wheel and spur gears on the shaft, as well as the gears on the spindle shaft, run in a bath of oil, an oil cup at the side of the attachment serving as an oil line.

The rack-indexing attachment used in connection with the rack-cutting attachment is fastened to the T-slot in the left-hand end of the table and consists of a bracket which carries an indexing and locking disk with change gears. It provides for cutting racks and making settings without relying on the usual dial for this purpose. The various gear combinations permit racks of different pitches to be indexed by making either a half turn, a complete turn or two complete turns of the locking disk. Eighteen change gears provide for the cutting of the following diametral pitches: 3 to 6, by half pitches; all pitches from 7 to 16; and all even pitches from 18 to 32. Circular pitches from 1 to 1/16 in., varying by sixteenths of an inch. The rack vise used has jaws 30 in. long and opens 5⅝ in.

The rack cutting attachment will be made also for the No. 1½ machine.

The Keith Car Works, Sagamore, Mass., have resumed operations after a shutdown of three weeks.

National Metal Trades Association to Meet in New York, April 19 and 20

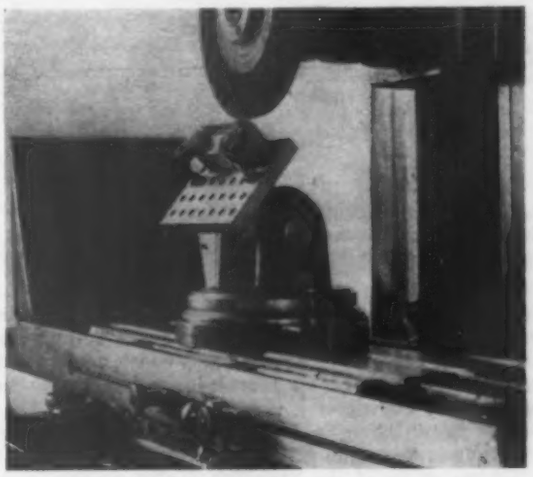
The 24th annual convention of the National Metal Trades Association will be held at the Hotel Astor, New York, on Wednesday and Thursday, April 19 and 20. On the Monday preceding, the executive committee will be in session and the 23 local branch secretaries will hold their semi-annual meeting. On Monday night, the Administrative Council and the local branch presidents and secretaries will meet at dinner. On Tuesday, the administrative council will hold its semi-annual meeting and the local branch secretaries will continue their sessions and at noon the administrative council, local branch presidents and secretaries will meet at luncheon. The annual dinner of the Alumni Association, consisting of the organization's past officers, comes on Tuesday evening.

The convention will open on Wednesday morning with a short business meeting, followed by a program of unusual interest. Able speakers have been secured to discuss business, financial and labor questions. The association, after a careful survey of apprenticeship training, covering a period of more than two years, has prepared a thorough-going plan of apprenticeship training, which will be submitted to the members at the convention.

Angle Fixture with Perforated Plate

A universal angle fixture with the plate perforated as shown in the illustration, for insertion of patent clamps, has been placed on the market by E. L. Krag & Co., 50 West Randolph Street, Chicago. The perforations and clamps are intended to facilitate fastening and adjusting the work, the fixture as a whole being designed to permit easy and economical angle set ups on milling machines, surface grinders and drill presses.

The plate swings a full 180 deg., or 90 deg. on each side from a horizontal position, and revolves a full 360 deg. on the base. Surfaces of the plate are ground true and square with each other. Both dials at the joints are graduated in degrees and the plate hinged



The Perforation of the Plate Is for Insertion of Patent Clamps, as Shown

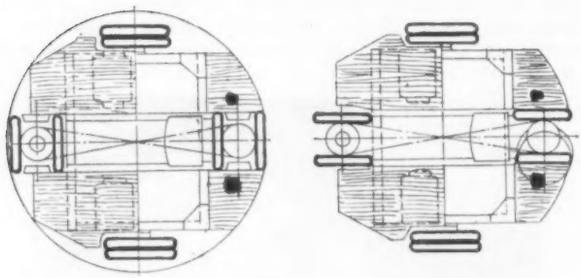
on a ¾-in. stud which is threaded at one end and is used to clamp the plate in the desired position. The faces of the large flanges on the plate engaging the faces of the bosses on the yoke lugs afford the necessary friction required to hold the plate fast. The yoke casting revolves on a 1½-in. pilot which fits into the center of the base, the yoke being fastened by two ½-in. bolts which ride in a circular T-slot in the base. All working surfaces are finished true and flat to assure perfect clamping. The three clamping nuts are of the same size, requiring but one wrench for all adjustments.

The base is 8½ in. long and 6½ in. wide. The height over all is 6¼ in. and dimensions of the plate 3⅜ in. by 4¾ in. The weight is 25 lb.

Electric Runabout Crane Truck

An electric runabout crane truck of the type shown in the illustration has been recently developed in England, the truck being manufactured by Messrs. Ransomes, Sims & Jeffries Ltd., Ipswich, and the crane mechanism by Messrs. Ransomes & Rapier Ltd., also of Ipswich.

In this design the turntable usually employed to



Full View of Runabout Electric Crane Is Shown Above. In the left hand sketch the wheels are adjusted for swinging the load, the other showing position of wheels for traveling

enable the crane to swivel independently of the chassis frame has been dispensed with, the crane being rigidly fixed to the chassis. The vehicle is constructed to turn on its own axis or run forwards or backwards in a path of any curvature.

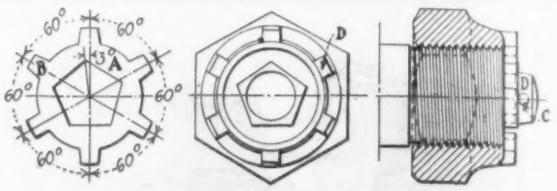
The crane being a fixture on the chassis, the jib is always in the same position relatively to it and there is no variation of the stability factor as the load is swung, resulting in a lighter weight of crane truck. The pressure on the road remains constant for all positions of the crane and is kept within low limits by its distribution between four wheels.

Each driving wheel is driven by an electric motor supplied by a battery carried on the truck. The steering wheels can be rotated in either direction to positions at right angles to the running positions, as shown in the illustration. Just before reaching this extreme position one of the running motors is automatically reversed so that the truck then rotates about its own axis.

Congress has approved an item of $158,000 in the deficiency bill to be used in carrying into effect the Lampert Act reorganizing the Patent Office personnel and revising salaries there.

New Form of Lock-Nut

In a lock nut of a type frequently employed, with six serrations, the nut may be locked in position within one-sixth of a turn, or, with two pin-holes at right angles, to within one-twelfth of a turn. *Comptes Rendus* describes a locking arrangement with finer precision of adjustment, devised by A. Rateau, which is suitable for special cases or for large sizes of nuts. It consists of a washer *A* with a pentagonal center and six projections *B*. One axis of the pentagon is displaced 3 deg. from one axis of the equi-spaced projections. The pentagonal center is an exact fit upon a pentagon at the extremity of the bolt, and the projections fit into serrations in the nut, with an allowance



Hexagon-Pentagon Form of Lock-Nut

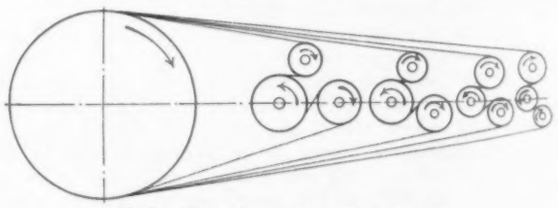
of 3 deg. play. The washer is kept in place by a pin *C* passing through the hole *D* in the bolt.

There are five possible positions of 12 deg. interval of the pentagon for each one-sixth rotation of the nut, and, by turning over the nut, another five positions 6 deg. from the previous. Thus, with a play of 6 deg., it would always be possible to place the washer in position. With a play of only 3 deg., the maximum tightening or loosening of the nut is 1½ deg. or 1/240 turn. If necessary, this precision could be increased by choosing, for the design, larger contiguous numbers than 5 and 6.

Novel Rolling-Mill Belt Drive

In a German wire factory a remarkable drive of approximately 1000 hp. for a continuous wire-rolling train has been running continuously for a period of over 10 years. Half the output of the engine is transmitted by spur-wheel gears to the roughing train with seven consecutive housings, while the remaining half of the output goes to the finishing train, to which it is transmitted by means of eight belt pulleys, four jockey pulleys, and four superimposed leather belts, all driven from the flywheel as shown in the illustration.

In view of the strong deflections and the high speed



Eight Mills Run from One Pulley

of the superimposed belts (98 ft. per sec.), the attempt at first sight appeared risky. The shocks and strains occurring in the working of the train are neutralized by the jockey pulleys being spring-loaded. The belt widths, are, successively, 40 in., 28 in., 26 in. and 24 in. According to *Engineering Progress*, the drive has given entire satisfaction.

The Erie Electrical Equipment Co., Johnstown, Pa., after considering various propositions to move from that city, has decided to remain there. At a special meeting of the directors, S. R. Burd was appointed sales manager, succeeding H. A. Selah, who retains his stock in the company and is still a member of the board of directors. Mr. Burd has been a resident of Johnstown for seven years and has been connected with the engineering department of the H. S. Kerbaugh Co. The officers of the company are: President, J. L. Hershberger; treasurer, J. F. Kress; vice-president, M. D. Bearer; secretary, Charles C. Kress.

Trade Aspects of Non-Ferrous Metals

The Manufacturer's Point of View Brought Out at Institute of Metals—British Specification Problems—Training Men for Management

(Special Correspondence)

LONDON, March 10.—The annual general meeting of the Institute of Metals, which concluded yesterday, was notable for the frank exposition of the manufacturer's viewpoint by the new president, Leonard Sumner. Among the papers submitted for discussion it was generally conceded that the one of outstanding merit and practical utility was Doctor Bengough's summary of the research work on the corrosion of condenser tubes, which he has been conducting, with the aid of various collaborators, for the past ten years, under the auspices of the corrosion committee of the institute. Doctor Moore and Mr. Beckinsale also contributed a valuable paper recounting their further investigations on season cracking, with special reference to condenser tubes.

The other papers were all of a high standard of merit, although in one instance the author appears to have made a rash attempt, for which he was politely but firmly reproved, to evolve a rather startling general theory from the results of a very special and restricted investigation. He is not the only sinner in this respect, however. The shoemaker thinks there is nothing like leather. Doctor Rosenhain thinks there is nothing like amorphous cement, Professor Thompson considers there is nothing like surface tension, while Professor Carpenter believes there is nothing like experimental data. No doubt, in a multitude of counsels metallurgical wisdom ultimately will be found.

Manufacturers More Coöperative

Beginning with a reference to the prestige of the institute, President Sumner said in his address that the *Journal* holds a very high place in the world's metallurgical literature. The membership increased in 1921 from 1298 to 1410. Student members, who numbered but 6 in 1916, are to-day no fewer than 116. Slightly over 13 years ago the institute began with 300 members. Much has been done to break down the old feeling of antagonism and mistrust that prevailed among manufacturers. The speaker said:

> During the war every manufacturer desired to do all he could for his country in its hour of need, and one and all both gave and received information. Exchange of visits to works took place, processes and methods of manufacture were shown, and that interchange of ideas, so much desired, freely took place. I am happy to state that this same spirit still prevails to a very large degree to-day. Before the war I think I had been through only one works that was in competition with my own. Since then I, or a representative of my firm, have been shown "really" round the works of all our principal competitors, and we have also had the pleasure of showing our competitors through our works and exchanging notes and ideas with them. We therefore may feel happy that this particular object for which the institute was founded has been largely realized.

Other subjects discussed in the address were specification and the scarcity of men with talent for works management. On these questions the views of the speaker are indicated in the extracts given below:

Unusual Specifications

Some years ago Sir Gerard Muntz complained that manufacturers had to work to some arbitrary specifications, and that we had some weird and strange tasks to perform, whereby the user got something which might be unsuited for the purpose required. He went on to hope that in due course the influence of the Institute of Metals would be such that the issuing of these weird specifications would soon become a thing of the past. I cannot do better than quote the words he then used:

> The chief matter is that the general knowledge of the non-ferrous metals is simply appalling by its absence; it leaves the greater scope for the work of the Institute of Metals: there is much to learn, much already known which can be taught, better taught by such a body as the institute than by any individual, or even by any university or school of metallurgy, because it would come with more weight from an institute embracing so many different classes of thought than from anywhere else.

I venture to think that to-day the manufacturer does get many less of these weird specifications to which he is requested to work. The user has gained knowledge, and if he does now make a specification to which he asks the manufacturer to work, there is usually some reason for that particular specification. Then there are other users who may have little or no knowledge of non-ferrous metallurgy. These users generally make no specification, but leave it to the manufacturer to supply what he thinks most suitable. If the material supplied is unsatisfactory, then the onus falls on the maker. Whatever the attitude taken by the user the position is unsatisfactory for both user and manufacturer. What would be ideal would be that the user should consult with the manufacturer; the user should explain his views to the maker; the maker should give his views; and that both parties should be so well acquainted with the properties of various alloys that between them a suitable alloy should be produced to meet the user's needs.

Generally speaking, however, that branch of industry with which I am connected has usually to work to specifications which have been drawn up by responsible bodies, such as the Admiralty, War Office, or the British Engineering Standards Association. These specifications have been put into force after consultation with the manufacturer. . . . The policy of allowing a certain amount of freedom to the manufacturer has, I maintain, been a good one, and I trust that it will be continued in the future as far as possible. Particularly in these difficult times, it is vitally important for the commercial prosperity of the industry that the manufacturer should have a large variety and range of raw material to draw upon. His choice should be as little circumscribed as possible.

Responsibilities of Metal Merchants

There is another body of men whom I would like to see more actively interested in the work of the institute. I refer to the metal merchants and brokers. The manufacturer is many times offered a material containing, say, 98½ per cent copper. The manufacturer asks what does the other 1½ per cent represent. The merchant cannot tell him, and he neither knows nor cares, so long as he can sell. Or, it may be, he offers a spelter containing 98½ per cent zinc, and if he is asked what are the cadmium contents, the dealer says he does not know, and perhaps asks, "What is cadmium?" There are members of this institute who are metal merchants, and I have no doubt that since joining they have been much impressed by the necessity for the manufacturer to know everything about the metal that he is offered, if he is to produce satisfactorily the product that is demanded by the user. In consequence, these metal merchants do take a great deal more care in obtaining information as to the metal they are offering, and are now much more frequently in a position to give full information than they were some years ago.

Makers have in the past (and are doing so still to-day, although perhaps in a lesser degree) pushed their wares under a fancy name or names. The alloy or metal may be, and often is, quite an ordinary alloy, but it will be dubbed, say, Smith's bronze or Jones's metal. The traveler goes out and preaches the virtues and the merits of, say, Jones's metal, and he prates

loudly of what this metal will do, and he is cautious enough, if he is properly posted, not to say what it will not do. The traveler is more often than not glib of tongue; he knows a little metallurgy, but very little; he gives results of tests of the metal which very likely are not applicable to the use to which the user wants to put the metal. . . .

I am bold enough to assert that the time is coming when no Jones's metal or Smith's bronze will be accepted by the user unless the manufacturer is prepared to lay his cards on the table and say at once what his alloy consists of. The alloy may be called any name one likes, but its constituents should be stated, and the maker should be prepared to stand by or fall with the metal he puts on the market. I have noticed that in recent times the tool steel makers, where they are still advertising their goods under their different trade names, are giving a complete analysis of the different grades of steel which they offer for varying purposes. This is an example which might with advantage be copied by the manufacturers of the non-ferrous metals, and, in the case of the more enlightened firms in the non-ferrous trade, is being put into practice.

Training for Management

Some four years ago, Professor Carpenter, in his presidential address, emphatically laid it down that students who were expecting to occupy technical positions in works must have been afforded opportunities to have works practic ein conjunction with their educational training. I am thoroughly in agreement with this view.

Professor Carpenter gave us the three types of students that the training developed. First, there is the type of man whose bent is originality, whose bent is research, who wishes to improve the product or find a new and improved product. To that man the task of seeing that the daily out-turn of tons of material of the same type was up to standard would be most irksome. His *métier* is research, seeking for something new, and in his sphere in a works he is most valuable. A second type of student is the man who is not bent on research work, but who takes a keen interest in works practice, who is interested in existing methods and processes, and brings about improvements and gets the best out of the men. He is keen not only on the quality of the product of his mill, but on the output of the mill—a most valuable type of man for a commercial manufacturing firm to have. In one sense he is much more valuable to a manufacturer than a man of the first type. This man is a producer, and helps to find the ways and means for carrying on the business, while the first type of man may be considered a bit of a luxury. Still, the first type must be employed, because, after a period of some years, he may produce, from his labors, knowledge and skill, something which may revolutionize not only one's ideas but works practice. The third type of man, as illustrated by Professor Carpenter, is the man who is afraid of taking responsibilities of his own, but is an accurate and faithful worker under some one else's guidance and direction. Occasionally this type of man blossoms out and displays some independence and originality, but it is not often.

Equipment for Management Rare

Of these three types of men, one would think that the second type would be the man who would rise to the position of works manager or managing director. The research worker would not have the inclination or the adaptability to attend to the mass of detail and routine work that falls to the lot of a works manager, and the analyst in all probability has not got the ability. And so it is to the second type of man that we look for the man to promote to the managership. And yet, what do we who are in charge of commercial undertakings in the non-ferrous industry find? It is one of th egreatest difficulties we have, to find a man suitable for these positions. A fellow competitor was telling me only a short time ago that he could get trained metallurgists, chemists, engineers in plenty, but that he could not find the right man for the managership. Why should this be so? The man in charge of a mill who is keen on his product and his output, and can get the very best out of the workers under him, should be simply invaluable, but is in my experience failing in appreciation of the fact that organization, detail and discipline are essential to the successful running of a commercial undertaking. For instance, the bringing together of figures for the cost clerk may be distasteful and irksome to him, and he probably resents the cost clerk, perhaps questioning some of the figures that he has sent up to the office. He would seem to fail altogether to appreciate the necessity for accuracy; and accurate costing is of the greatest importance in a factory. He fails perhaps to work with other departmental heads. He may be running his mill on A's order, and word comes to stop production on this order and turn on to B's order. This upsets his arrangement, and he resents it. He does as he is requested, but unwillingly and grudgingly. Why should this man be lacking in these essentials for works management?

Is it a fault of his training? I do not express an opinion, but I would like our professors and teachers to ponder over the fact and ask themselves why it is that the students they have trained so carefully and with so much pains do not rise, generally speaking, to take those higher positions on the non-ferrous manufactures to which it would seem their training would eminently fit them. I am not sure that in the training in this country we do not specialize a little too much, and that the training should not be broader and more varied. Sometimes, too, I am inclined to think that our teachers are prone to be too much interested in the brilliant student to the possible neglect of the student who is not so clever. They seem to overlook the fact that industry requires many sound and able men and but a few brilliant men.

Efficiency of Labor in Germany

Reports from the German statistical office, relating to the daily output per worker in coal mines, show a steady falling off, together with a steady increase in the number of men employed in the mines, and a loss in mine production. The figures are drawn from three districts—Ruhr, Upper Silesia and Sarre. They show the number of workers employed in the average month of 1913, in each month of 1920, and in each of the first 8 months of 1920, together with the daily output per worker under each of those dates. The general results are tabulated below:

	Average Month—		
Ruhr District	1913	1920	1921
Workers employed	390,600	496,600	542,800
Daily output, kilograms per man	972	582	569
Upper Silesia			
Workers employed	123,300	173,100	176,700
Daily output, kilograms per man	1,177	616	520
Sarre District			
Workers employed	46,700	71,200	74,800
Daily output, kilograms per man	868	479	499

It will be found from the above tabulation that the daily output in 1913 averaged 380,000 (metric) tons for the Ruhr district, this figure decreasing to 289,000 tons in 1920, and going up to 309,000 tons in 1921. In Upper Silesia the average output in 1913 was 145,000 tons per day; in 1920, 107,000 tons per day; and in 1921, only 92,000 tons per day. Part of this latter drop was due to the political troubles last May. Similar figures for the Sarre district show an output in 1913 of 40,500 tons; in 1920 of 34,100 tons; and in 1921 of 37,300 tons per day.

Canadian Iron and Steel Output in January

The year end decline in the Canadian production of pig iron was carried into the new year, states the Dominion Bureau of Statistics, Ottawa, and the output of pig iron dropped still lower in January to a new level of 32,184 gross tons, all made in blast furnaces, as compared with 39,917 tons in the month of December. The production of steel ingots and castings during January declined almost 10,000 tons from the quantity produced in December. The actual output was 33,011 tons of ingots and castings, comprising 31,163 tons of steel ingots and 1848 tons of steel castings.

The Storage Racks Are Shown Above. In some cases the heavier bars are placed at top to facilitate handling by overhead crane. The identification board is shown below

STORING OF STEEL BARS

System Used by Machine-Tool Builder—Colors Denote Brand—Special Racks to Facilitate Handling

In standardizing the identification and storage of steel bars to conform to the efficient manufacturing system developed for their new plant, Gould & Eberhardt, Newark, N. J., have devised a system and equipment that has unique features. Construction of special racks was necessary because of the lack of standard equipment on the market that would meet the particular situation. The system developed has facilitated the handling of the steel, eliminating loss of time and the chance of error in locating the piece desired.

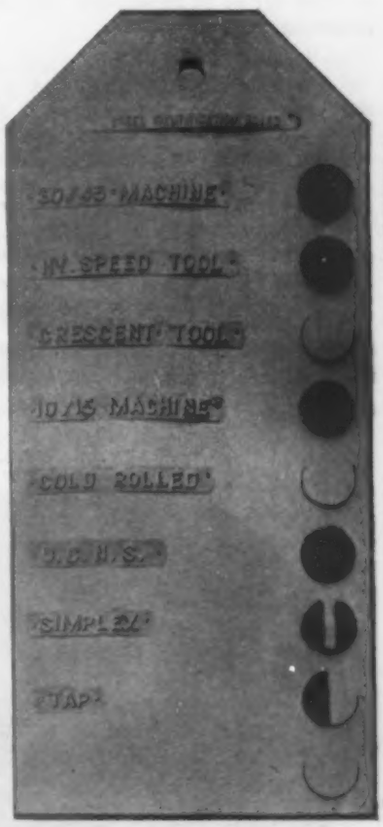
In the manufacture of shapers and automatic gear-cutting machinery many different kinds and sizes of steel bars, round, square, hexagon and rectangular, are used. In the method devised plain colors and combinations of colors are used to mark the steel, each color or combination serving to identify the metallurgical contents or the particular make. The identification colors are painted on the ends of the bars as they are received in the shipping department. To assist the raw-material clerk in selecting the proper steel, a conspicuous identification board, shown in the accompanying illustration, is hung above each rack. On this board are listed the names of the different kinds of steel used by the company, with a 2-in. disk as shown, painted in the corresponding color opposite each name. The board has a white background which shows the various colors to the best advantage. The various steels with their corresponding colors as listed on the board are:

30/45 Machine	Red
Hy-Speed Tool	Blue
Crescent	Yellow
10/15 Machine	Green
Cold Rolled	White
O.C.N.S.	Halves of green and red
Simplex	Green with white stripe
Tap	Halves of green and white

Racks Permit of Easy Handling

The storage racks are shown in the illustration. Each rack is built up of five duplicate steel frames, spaced 4 ft. apart and braced to form a rigid rack 16 ft. long. The individual section has a base consisting of an 8-in. I-beam, 8 ft. long, with six heavy 2 by 2 in. angles, 7 ft. high equally spaced and forming uprights to divide the section into five tiers. These tiers are in turn subdivided by ½-in. rods which extend from top to bottom, making ten tiers available in each rack. The cross pieces or shelves on which the steel bars lie are heavy 2 by 2 in. angles, spaced about 20 in. above each other at the bottom but diminishing in this distance until at the top, where the very small rods are stored, the distance between the shelves is only 6 in. The top piece of each section is a heavy 2 by 3 in. angle, which makes a rigid top brace to complete the frame of the section, and also permits the storage of extra-large diameter short bars on top of the rack.

The five sections are spaced and held together to form the completed framework of the rack by 2 by 2 in. heavy angle stringers extending the full length of the rack at the top and bottom of each side. Further longitudinal bracing is provided by ¼ by 2½ in. flat bars crossed between and bolted to the top and bottom of the sections. An extra angle at the top on each side and extending the length of the rack prevents pieces from rolling off. Further precaution is taken by using timbers with half-round notches cut in them along the front on top of the rack, permitting short round pieces to be set in place.



The most convenient way to place the steel in the rack would seem to be to have all of the same kind in one tier, with the largest and heaviest pieces on the bottom shelf and the varying sizes in regular order, according to their dimension, with the smallest at the top. This order, however, has been reversed wherever possible. In some cases the square, hexagon, or rectangular shaped bars, which are generally smaller in size, are placed on the bottom shelves, and the very heavy bars on the top in order that they may be easily handled by the overhead traveling crane.

To facilitate the placing and finding of the various

kinds and sizes of steels in their proper location, each rack is given a section number. Each tier in the rack is also lettered and each shelf numbered, making it a simple matter to give instructions for the proper location of each bar as it is received, besides facilitating the keeping of stock records and taking inventory.

New Etching Medium for Chromium and Tungsten Steels

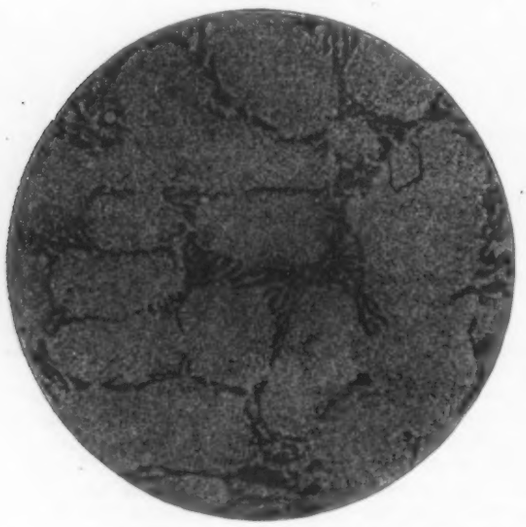
Special Solution for Detecting the Presence of Carbides—Valuable as Applied to High-Speed Steels

A NEW etching medium, to be used in developing the microstructure of tungsten and chromium steels, is discussed by Dr. K. Daeves in the issue of *Stahl und Eisen*, Sept. 8, 1921. It was developed for steels containing carbides that were not attacked by the usual sodium picrate etching. The best solution has proved to be:

20 grams potassium ferricyanide
10 grams sodium hydrate
100 grams water

Such a solution was suggested by the two Japanese workers, K. Honda and T. Murakami, but further work was necessary to test and develop it. The solution given above slowly decomposes in the cold, and fairly quickly when heated, giving ferrocyanides. The microsections are polished and etched in either the cold or boiling solution for 15 to 20 seconds. Results are shown in the following table:

	Composition			Etching Results	
				Cold	*Boiling*
No.	Carbon, Per Cent	Chromium, Per Cent	Tungsten, Per Cent		
1	2.18	9.8	...	Eutectic colored.	Similar to cold solution, but stronger (more darkly colored).
2	1.94	5.2	...	Eutectic colored.	Similar to cold solution, but stronger (more darkly colored).
3	1.23	0.54	...	No effect.	Crystal junctions light brown.
4	0.80	5.0	...	Excess eutectic colored.	Similar to cold solution, but stronger.
5	0.54	5.25	...	Traces of eutectic were colored.	Similar to cold solution, but stronger.
6	0.40	8.16	...	Traces of eutectic were colored.	Similar to cold solution, but stronger.
7	0.21	11.50	...	Isolated carbide particles at the crystal junctions colored.	Similar to cold solution, but stronger.
8	1.46	1.10	...	No effect.	Excess cementite blue, pearlite cementite weak yellow.
9	1.00	1.37	...	No effect.	Excess cementite blue, pearlite cementite weak yellow.
10	1.25	...	0.8	No effect.	Cementite of the pearlite yellow to blue.
11	1.15	...	1.2	No effect.	Cementite of the pearlite yellow to blue.
12	0.80	4.10	12.2	Small and large carbide particles were colored.	Similar to cold solution, but stronger.
13	0.70	4.00	19.0	Small and large carbide particles were colored.	Similar to cold solution, but stronger.



A Chromium Steel Containing 9.80 Per Cent Chromium and 2.18 Per Cent Carbon Etched Cold with the New Solution

The appearance of sample No. 1 etched with the cold solution is shown in the illustration. Only the carbide in the eutectic of all steels with free eutectic is colored yellow to blue. Also with alloys that are just under the limit of solubility of the eutectic in the iron-chromium-carbon diagram (and have no free eutectic) isolated carbide particles at the crystal junctions are colored.

The test showed that the new etching material in the cold is not a good reagent for Fe_2W. It will show clearly, however, whether any excess eutectic is present in chromium steels and possibly also in tungsten steels.

This is important, because this excess separates out between the crystals, and even a small amount brings about a marked change in the properties of the material, especially an increase of brittleness. Also as the eutectic becomes fluid at comparatively low temperatures the rolling and heat treatment of such steels, unless carried out with the greatest care, leads to serious trouble. With all steels used in construction work the overstepping of the limit of free eutectic is to be avoided.

For high-speed tool steels, which considerably exceed the limit, this method of examination is of value in determining whether the eutectic is properly broken up by forging and distributed properly through the metal. It can be used hot for showing the secondary cementite and pearlite of all tungsten steels, and as it only attacks the carbide of the pearlite it perhaps gives clearer, sharper structures than normal acid etching, which shows the difference in height between carbide and ferrite. It may be mentioned that very long etching with hot solution slightly colors the pearlite of ordinary carbon steels, probably due to decomposition of the solution.

The new solution, therefore, can be used cold for identifying the carbide of the eutectic of chromium steels, thereby showing whether excess eutectic is present, which is to be avoided in construction steels. It is also suitable for developing the structure of high-speed tool steels, and, as mentioned before, can be used for tungsten steels.—G. B. W.

A sentence in the article on page 766 of THE IRON AGE of March 16, reviewing the book, "Wealth and Income of the American People," was made meaningless by a typographical error. The second sentence in the paragraph next to last should read: "What Mr. Ingalls does is to analyze the figures," etc.

Development of Continuous Rolling Mills

Fundamental Conditions Affecting Design—Application to Specific Products and Specific Problems —Co-relation of Units

BY JOHN W. SHEPERDSON*

CONTINUOUS rolling is the most scientific method of forming metal so far discovered. It is for this reason alone that out of the round 30,000,000 tons of present-day annual production of hot-rolled steel in the United States, at least 30 per cent is roughed or finished in continuous mills. It is true that the construction and operation of continuous mills involve many difficult problems, and require greater experience than with other types of mills; nevertheless, the continuous process of rolling is being rapidly extended, particularly in this country, to many new lines of product, thus ever increasing the proportion of the total tonnages rolled on continuous mills. Changed labor conditions in other countries, as the result of the war, make necessary the use of improved labor-saving machinery, and many continuous mills are now being laid down in Europe.

For the mechanical treatment of steel some process better than rolling may be discovered; but, so long as rolls are employed, there seems to be no prospect of equalling the continuous mill in the following important and fundamental features:

The practicability of finishing very long lengths, limited only by the ability to handle the finished product.

The possibility of uniform heat treatment from end to end of a bar of any length, due to uniform time and exposure from furnace to finishing pass.

Low power consumption, due to rolls of small diameter.

Low fuel requirements for heating, because of rapid rolling and short exposure.

Freedom to use the maximum size of roll neck, due to two-high construction.

As the continuous mill is commonly thought of as being the last type to be conceived and put into practical use, few people realize that it began its existence in the same period in which other types of mills were taking form. The decade between 1856 and 1866 saw the inception and establishment of several distinct types of mills now in use.

In the same decade—in 1862—George Bedson of Manchester, England, built and operated the first continuous rod mill. Fig. 1 shows the second mill built by Bedson, in 1868. It is still running and doing good work. The first mill laid down in the United States was made from the same patterns. It must be observed that the mill consists of alternate horizontal and vertical rolls. As first built, it was straight continuous from end to end. In 1896 it was divided into two parts.

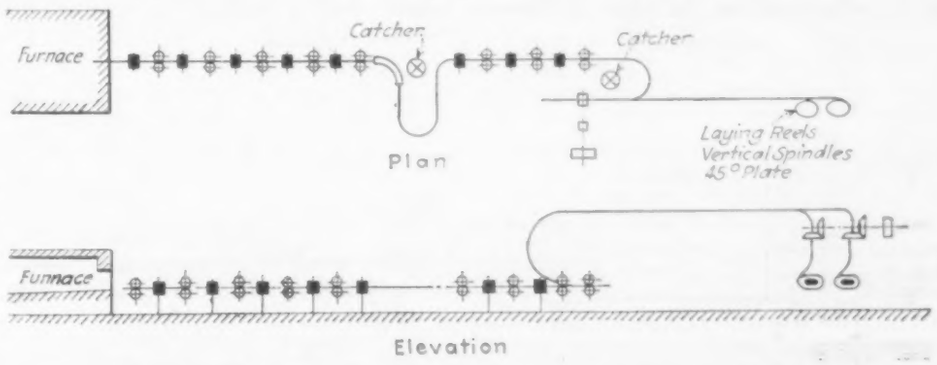


Fig. 1. Continuous Wire-Rod Mill at Works of Richard Johnson & Nephew, Manchester, England, with One Vertical Loop

Though the credit of building the first continuous mill belongs to England, it was in the United States that Charles Hill Morgan of Worcester, Mass., took up the development of this type of mill, and in his life saw it reach a place of great importance, due to the American ingenuity of himself and his associates. It was quite natural that the New World, with its younger steel industry, should have taken up this advanced method of rolling. American capital was willing to provide special mills for the development of standardized products, and so gave the continuous mill the necessary impetus in its early life to reach the high place which it has held by demonstrated merit.

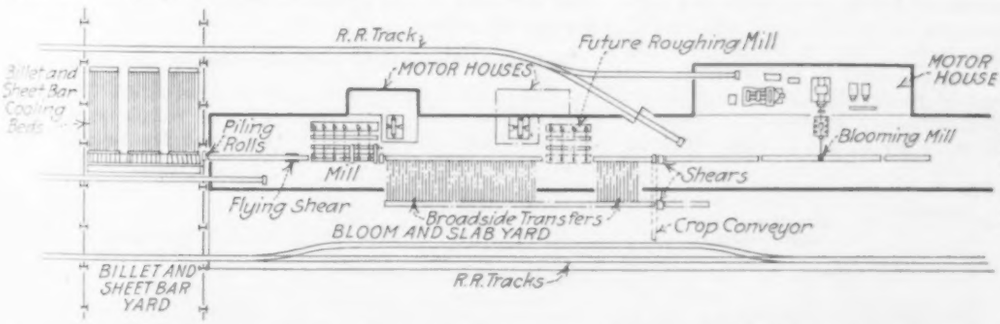


Fig. 2. Blooming Mill and Continuous Billet and Sheet-Bar Mill, the Roughing Mill Being for Future Installation

Continuous Billet Mills

A discussion of continuous billet mills naturally involves a discussion of the use of small billets, which these mills have made available at low cost. Before continuous billet mills became an integral part of blooming mills, the 4 x 4-in. billet held the field. This billet established itself so firmly because it was the smallest size the ordinary blooming mill could roll and maintain any semblance of output. When smaller initial sections were needed to satisfy the requirements of small mills, they were secured by special means.

*Engineer, Morgan Construction Co., Worcester, Mass. The paper was read before the Engineers' Society of Western Pennsylvania.

The development of continuous and other finishing mills to take small billets came simultaneously with the necessity of giving relief to the blooming mill, which, as a link in the production chain, was becoming severely taxed. It was, therefore, quite natural that, when the design of the continuous billet mill was undertaken, the following were the major aims:

To secure, direct from the ingot heat, as small a billet as was adaptable to subsequent use in finishing mills.

To start the continuous billet-rolling process from a section enough larger than a 4 x 4-in. to afford the desired relief for the blooming mill.

To roll the product of a whole ingot in one undivided length, and thus reduce to a minimum the losses in crops and shorts.

Minimum Billet Section

In the interests of both the continuous billet mills and the mills which use the billets, a standard length is necessary. The practice of using 4 x 4-in. billets of every imaginable length, cut specially for each order, increases discards and throws an entirely unnecessary burden on the operating force in the mill and stock yard. The 1.75-in. billet is in the main the minimum commercial section, and has firmly established itself as a standard for a multiplicity of uses. It represents 100 elongations from the usual ingot cross-section. A No. 5 wire rod represents in turn 100 elongations from the 1.75-in. billet, which makes 1.75 in. a logical size at which reheating should be done. The 30-ft. 1.75-in. billet makes a rod bundle of 300 lb., a suitable and popular weight in American wire mills. Furthermore, 30-ft. lengths fit conveniently into railroad cars and can be easily loaded and unloaded in heavy lifts.

In the development of passes for the production of 1.75-in. billets, it was obviously necessary to bear in mind that not in all cases would the 1.75-in. billet be with the extent to which the blooming mill is taxed by the steel making capacity back of it.

When a small beginning is being made, and the blooming mill is not taxed, a continuous billet mill of six stands can be employed, in which case the entering section is from 16 to 20 sq. in. In such cases, provision is usually made for the interposition of additional continuous roll stands between the blooming mill and the billet mill, for later tonnage development. Even in this case, the problem of dividing the work between the blooming mill and the billet mill is not clear cut. Quite frequently, an investment in an excess of soaking-pits proves attractive in order that the blooming mill may run single turn, while the steel-making plant is running 24 hrs. To maintain a high rate of output during its own operating time under these conditions, the blooming mill should be relieved of all extra passes by the installation of a 10-stand billet mill divided into two parts, and receiving a bloom section of about 42 sq. in. Such a combination, quite apart from its value in having sufficient capacity in a single turn to keep step with the plant, will also have ample capacity for promptly clearing congestion due to bunched heats.

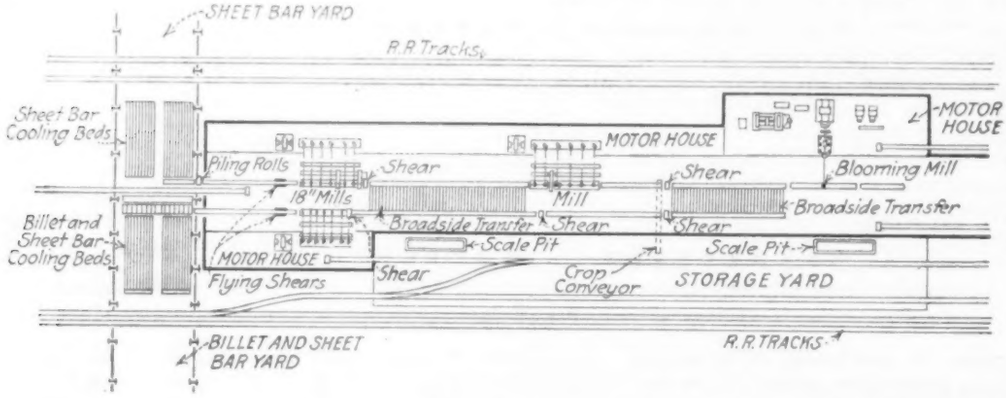


Fig. 3. Blooming Mill and Continuous Billet and Sheet-Bar Mill (One Roughing and Two Finishing)

Eight passes, corresponding to an entering section of 25 to 30 sq. in., are used very rarely in a permanent layout, and the conditions must indeed be very special to justify this rolling program. In such an instance, the eight passes are arranged in straight continuity without interruption. The point beyond which it does not seem advisable to extend pure continuous billet rolling is about 64 sq. in. of entering section. The billet mill for such a size should consist of two parts, each having six passes.

Rolling of Product of a Whole Ingot in One Length

The usual present-day ingot weighs about 7000 lb. The rolling of a whole ingot of this weight into 700 ft. of 1.75-in. billets is entirely beyond the limitations of any other than a continuous mill coupled with a flying shear. The invention of the flying shear by Victor E. Edwards has removed practically all limitations of initial ingot weight, and has given to the steel industry a piece of equipment which unquestionably has done more than any other machine to maintain yields at a high figure. It has also made the combined blooming and continuous billet mill realizable, and has given these mills their present-day tonnage making ability.

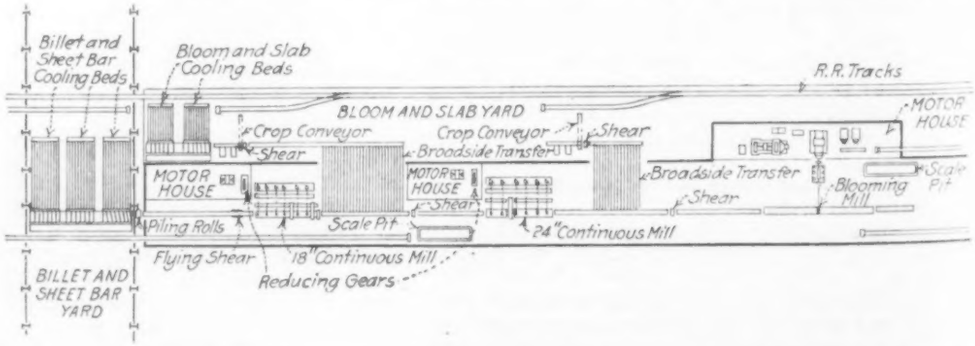


Fig. 4. Combination of Blooming Mill, Continuous Roughing Mill and Continuous Billet and Sheet-Bar Mill

If one were entirely to disregard the low operating

cost of the continuous system as compared with any other rolling scheme, the high yield, the direct outcome of rolling long lengths, alone would be found to justify the continuous billet mill.

Continuous Sheet-Bar Mills

Sheet bar, like billets, is an intermediate product rolled direct from the ingot heat in continuous mills.

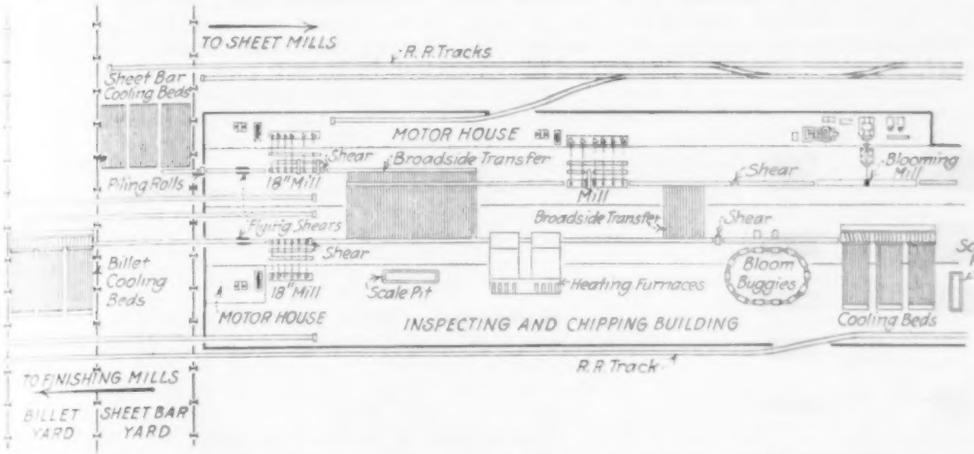


Fig. 5. Blooming Mill, Billet Mill and Sheet-Bar Mill Arranged for Special Conditions of Flexibility

Until recently sheet bar was used almost exclusively in 8-in. widths, but present day practice is properly extending the range of widths up to 12 and 14 in. in the heavier foot weights. This results in economies at the sheet mills.

Since practically the same considerations govern the design of continuous sheet-bar mills and of billet mills, the two mills are frequently combined, and one or the other product is produced by changing the rolls. Roll-speeds in such mills are governed, not by the sheet bar, but by the billet passes.

The demand for width variation in sheet bar has led to a departure from the tongue-and-groove method, which was used generally when sheet bar was confined to an 8-in. width. The combination of cylindrical rolls with vertical edging rolls now affords a maximum of flexibility, and produces sheet bar accurate in width, with clean edges, and of very uniform foot weight. One of the edging mills is located in front of the first pair of rolls of a six-stand sheet-bar mill. Its function is to perform the major part of the width reduction and to crack the scale, leaving a slight reduction for the second edging mill, located immediately following the second pair of horizontal rolls. This second edging pass is merely to iron out the inequalities and to dress the edges, as at this stage the ratio of the width to the thickness is great, and heavy side reduction is impossible.

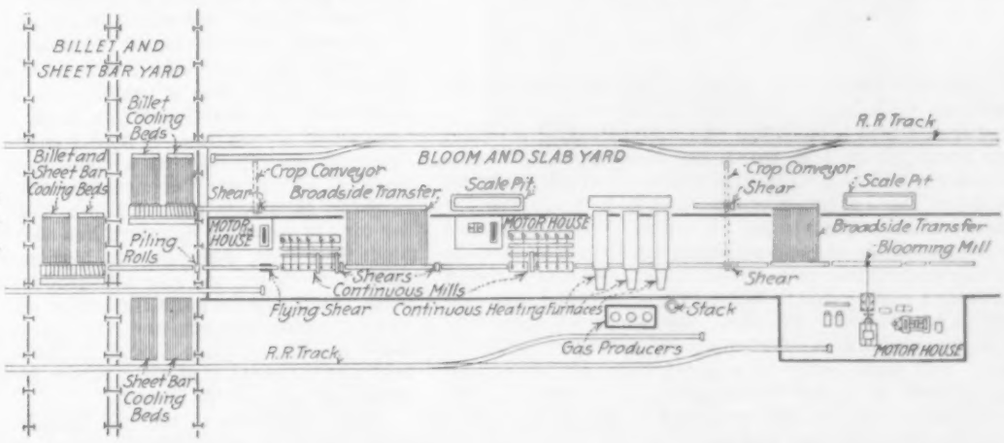


Fig. 6. Continuous Mills, Together with Furnaces for Reheating Slabs

Arrangement of Units for Blooming Mill, Billet Mill and Sheet-Bar Mill

The arrangement of the various units composing a blooming mill, billet mill, and sheet-bar mill differs in each plant, due to local requirements and conditions, proximity of other mills, available track service, etc. Nevertheless, such a mill properly laid down will realize certain minimum essentials:

The blooming mill must be provided with an independent outlet for its product through a bloom shear or slab shear to a bloom yard.

The continuous mill must be divided into two separate mills, and the distance separating them must be greater than the greatest length that the first mill will ever deliver, in order to afford a maximum of freedom in rolling, and also to permit diverting the product at this point through a shear into a yard.

The first mill, being necessarily of heavy construction, preferably 24-in. nominal diameter, must have in its rolls all the working and dummy passes to produce the range of sections its program embraces. Roll changing in such a mill is too much of a burden to be assumed except in occasional emergency, forced by breakage of rolls. All of these passes must be arranged in definite lines and must be fully equipped with guides, so that a bloom can be directed into any line by a switch in front of this mill.

The second mill must have a pass design which will render available all the desired small billet sections in a single set of rolls. In cases where both billets and sheet bar are produced, the mill must also have a set of sheet-bar rolls, which latter should preferably have their own set of housings, in order that the change from billets to sheet bar, and vice versa, may be made as expeditiously as possible. With a double equipment of housings, the rolls for billets can properly be longer than the short, stiff rolls that are required for accurate sheet-bar rolling.

In Fig. 2 to 6 are shown several plans of mill combinations for blooming, billet, and sheet-bar mills which satisfy these essential conditions. Each lay-out shows some particular feature of general arrangement which would be difficult to describe without the aid of illustrations.

With the arrangement of blooming mill and contin-

uous billet and sheet-bar mill shown in Fig. 2, blooms and slabs rolled by the blooming mill can be diverted by a broadside transfer through a heavy shear into a bloom yard. In this installation, the billet and sheet-bar mill is direct connected to an electric motor; and this motor is placed under the crane in the main building, but in a separate motor room, while the control and switchboard are in a lean-to. Provision is made, as shown in dotted lines, for the future installation of a continuous roughing mill, and a broadside transfer for carrying out heavier billets through the building columns into the bloom yard, for which purpose a girder

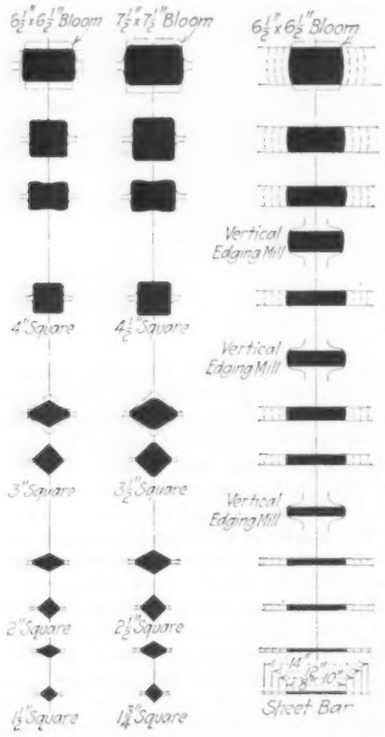


Fig. 7. Arrangement of Passes for Billets and Sheet Bar

of sufficient length has already been provided in the building.

Fig. 3 shows a blooming mill and a continuous billet and sheet-bar mill in which the bevel-gear, transmission and electric motors are in a lean-to of the main building, thus permitting the broadside transfers for blooms and for the product of the first continuous mill to be kept inside of the main building. Provision is made for the installation of a second 18-in. mill with a flying shear and cooling beds. When this is installed, one mill will be permanently for sheet bar, while the other will always make billets. The roughing mill over-feeds the 18-in. mill sufficiently to support both of them. An edging mill of heavy construction is provided in the continuous roughing mill, to afford flexibility in rolling a multiplicity of slab widths.

Fig. 4 shows a combination of a blooming mill, 24-in. continuous roughing mill, and 18-in. continuous sheet-bar and billet mill, in which high-speed motors drive the continuous mills through reducing gears. In this mill, a shear is introduced approximately midway in the connecting table between the two continuous mills, to part the billet so that is can be diverted into the adjoining yard over a narrow broadside transfer. When steel is not so diverted it is passed on to the 18-in. mill in a single length. This arrangement has the advantage of leaving the working side of the mill entirely unobstructed, and of requiring a girder of only moderate length to pass the broadside transfer into the billet yard.

Fig. 5 shows an arrangement of blooming mill and billet and sheet-bar mills for special conditions. In addition to the features previously emphasized, an inspection and chipping building runs parallel to the main building of the mill. Two furnaces, capable of taking 30-ft. billets after they have been chipped, deliver them heated to the 18-in. billet mill. This provision is made to care for alloy steel, where it is advisable to remove surface imperfections before the steel is reduced to minimum section.

Skelp, when too wide for the continuous skelp mill and too narrow for the universal plate mill, can properly be rolled on continuous mills, provided the temperature can be maintained to secure the skelp thicknesses. Fig. 6 shows continuous furnaces for reheating slabs from 8 to 16 in. wide for rolling into skelp.

Fig 7 shows a typical arrangement of billet and sheet-bar passes. The sheet-bar reductions are made on plain cylindrical rolls, with the width controlled by vertical edging rolls.

(To be continued)

New Small Tools and Gages

A micrometer depth gage, inspector's micrometer caliper gage, dial sheet gage and a less expensive combination square than its standard No. 11, are among the new tools recently placed on the market by the L. S. Starrett Co., Athol, Mass.

The micrometer depth gage has a 1-in. movement of the screw and is equipped with three measuring rods, 0 to 3 in., by thousandths of an inch. The inspector's caliper gage is for accurate measurement of the walls of hollow cylindrical forms and the dial sheet gage is for sheet metal, paper, etc., pressure on a thumb button permitting insertion of the sheet between the two contacts. With release of the pressure the thickness is indicated on the dial. Thicknesses up to 0.150 in. in thousandths can be measured.

The new combination square is for carpenters and others not requiring the finer graduations and combines a marking gage, rule, square, miter, depth and height gage, level and plumb. A beveled-edge square known as the No. 55 is also offered. A double steel square having a 4-in. sliding block is similar to the Company's No. 14 square, but has a larger beam. An 18 in. vernier height gage with heavy base is also offered and is made with graduations in English, metric and both English and metric measures.

Standard end-measuring rods with rubber handles and with flat ends which are hardened, ground and lapped parallel, and a useful tool consisting of four small rules ¼, ⅜, ½ and 1 in. long, respectively, have been added to the line. A holder is provided into which the rules may be set at a convenient angle for easy reading. They are for accurate measuring of small recesses, shoulders, etc. A bench block for use in driving pins in round or flat work has also been added. The blade is a 3-in. disk, 1½ in. high and has nine holes from ⅛ to ⅝ in., and also a V-groove for holding round work. A thickness gage for use in adjustment of automobile motor tappets and the gaging of slots, contains six leaves from 0.0015 to 0.015 in. thick which fold into a metal case on a screw stud, removable for replacing any of the leaves.

Other additions to the line include a protractor and depth gage, a nickel-plated metal case for 1-in. micrometers, a T-handle tap wrench; tape hooks for attachment to ¼-in. or ⅜-in. steel tape and plumb bobs for attachment to steel tapes used for gaging oil or other liquids in tanks.

New High Record

The blast furnace of Weirton Steel Co., Weirton, W. Va., on March 15, established a new high record for one day's production of pig iron from one furnace when it tapped 845.6 gross tons of pig iron. This is the second record made in a week by this furnace which on March 9, produced 826.1 gross tons, thus surpassing the former production mark previously held by No. 1 furnace, Pittsburgh Steel Co., Monessen, Pa. In the first 15 days of March the furnace of Weirton Steel Co. produced 11,105.3 gross tons, an average of 740.35 gross tons per day.

Safety Hoist Hook

A hoist hook of the type shown in the illustration, intended to provide safer operation than the open hook commonly used in foundries, machine shops, steel construction work, mines, oil fields and railroads, is being marketed by the Frank W. Trabold Co., 30 Church Street, New York. It is known as the Yankee safety hook and made in five sizes, from 1 to 25 ton capacity.

It cannot be placed securely in the sling chain unless the hook is placed in a locked position, and cannot be released from the sling until the load is safely

The Hook Cannot Straighten Out or Unlock While Under Tension

landed in the position intended. It is to be noted that the hook cannot straighten out nor unlock while under tension and also cannot catch on any projection that it may hit in mid-air.

The component members are the hook, latch, shank and swivel. The swivel feature is for easy landing but the hook is also made without this member, for standard equipment. The hook is also furnished with straight shank for attachment to standard blocks or hoisting equipment. An elongated hole in the main-hook member permits raising that member sufficiently to allow the notched portion of the hook to clear the notched portion of the latch member only when the load is landed.

The body parts are drop forged from a high grade carbon steel, and Monel metal pivotal pins are incorporated, being non-corrosive and assuring high resistance to shearing strain.

Lake Shipping Hampered by LaFollette Act

Attention has been called to the burdens that have been placed on the lake shipping industry by the La Follette seamen's act in a report issued during the past week by the board of directors of the Cleveland Chamber of Commerce, which sharply criticises various provisions of that act. The report urged either the repeal of four sections of the LaFollette act or that the act be amended so that vessels on the Great Lakes be exempted from complying with provisions of these sections. The report states that the act has necessitated a material increase in the size of crews and wages. Before the passage of the act, 25 men were sufficient to handle a bulk freighter, but a crew of 33 is now required, while Canadian vessels use a crew of only 27 and pay lower wages. The passage of the act has caused 75 lake freighters to be transferred to Canadian registry, and the Canadian lake fleet has increased 35 per cent while the American fleet has gained only 1 per cent.

It is pointed out that not a passenger boat has been built for American Great Lakes service since the passage of the act. On the contrary, some boat lines have either curtailed their service or whole routes have been abandoned. The provisions of the act found particularly objectionable are those limiting the number of passengers allowed on a boat, fixing the minimum size of crews, the length of the working day in port and the minimum percentage of able seamen. The report states that the requirements of the act increased navigation costs and freight rates.

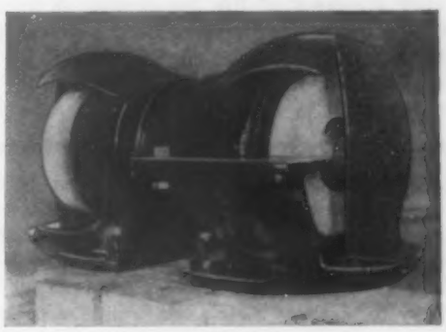
Rolled Zinc in 1921

The output of rolled zinc in the United States in 1921 fell off nearly one-half, as shown by reports made to the U. S. Geological Survey by producers. The notable feature of the year was the importation of large quantities of sheet zinc, for only a few tons had been imported each year since 1915. From April 1 to June 30, 1921, there was imported and entered for consumption 4245 tons of sheet zinc. In the first quarter also the imports were large, but during the last half of the year they were very small. At the close of the year the price of American sheets was less than that of the foreign. The output of rolled zinc in the United States was as follows in pounds:

	1920	1921
Sheet zinc not over 1/10 in. thick	56,812,989	28,580,904
Boiler plate and sheets over 1/10 in. thick	3,950,489	2,545,755
Strip and ribbon zinc	45,704,052	29,673,527
Total rolled zinc	106,467,530	60,800,186

Grinder with Self-Contained Dust Exhaust

A grinder equipped with a self-contained fan for removing the dust has been brought out recently by Forbes & Myers, Worcester. This method of exhaust is claimed to be as effective as any for single machines where dust may be conducted directly outside and less expensive than installing a separate motor and fans for a single grinder. It has not sufficient power,



Grinder with Self-Contained Dust Exhaust

however, to carry dust through long pipes with many turns and is not intended to take the place of large exhaust systems.

In the illustration one end of the grinder is shown with tool rest and the other end without, the machine being furnished with both ends either way. The motor is of the induction type fully inclosed, for single, two or three-phase alternating current, and of ⅓ and ¾ hp. Hess-Bright bearings are used, which are also fully inclosed. The centrifugal fans, located between the bearings and the grinding wheels, blow the dust directly back through the exhaust pipe.

Rejects All Ship Bids

WASHINGTON, March 20.—The Shipping Board today rejected all bids received for the 1490 Shipping Board vessels recently announced for sale. Chairman Lasker said bids were received for about 100 ships and "there was not a serious bid in the whole lot." He said he was convinced there was no market for ships at this time in the United States, and probably there would not be any market until Congress decided the subsidy question now before it in the form of a bill.

Reduced Production Cost A Prime Need

What Measures May Be Used to Forecast Business Trends—How Expectations So Far in 1922 Have Been Fully Met

BY NATHANIEL R. WHITNEY, PH.D.*

AS we advance farther into the year, it becomes increasingly evident that the predictions of those who asserted, toward the close of last year, that the corner had been turned and that business was definitely on the up-grade were well founded. Although the betterment which was predicted is now visible in many directions, it is still impossible for many business men to observe signs of this improvement in their own business. It is clear, however, that a real change for the better has occurred, although the improvement is not evenly distributed.

In this article effort is made to set forth in general terms the evidence upon which it is now frequently asserted that business conditions are improving. In a subsequent article the statistical verification of this claim will be presented in accordance with the theory and plan outlined.

After all, it requires a comparatively small change in the volume of business to convert depression into prosperity—the difference between a period of depression and a period of prosperity being estimated at 10 to 15 per cent in volume. Considerable industrial activity occurs even in periods of depression. Many of the ordinary processes of life are carried on as usual and it is from the savings of persons engaged in these lines of activity, and from the purchases made by such consumers that the foundation is laid for each new upward movement.

Increased Savings Accounts in Depression Period

This is strikingly indicated by the fact that, even in periods of depression when unemployment exists on a large scale, the number of savings accounts and the volume of savings deposits in the banks reach new high levels. The explanation is simple; the employed bend every energy to increase their savings as a measure of protection against the possibility of unemployment which may come upon them as upon their fellows almost any day. Gradually, as savings are thus made available and interest rates decline, business men are encouraged to resume activity. But they begin timidly and cautiously, and it requires considerable time after the turn has occurred before the improvement in conditions becomes marked. No one can say just how long will be the period of recuperation or convalescence in which we now are, but it is satisfying to know that the situation is better than it has been and that unless something unforeseen occurs it will continue to improve throughout the year.

There is ample justification for optimism, but it should be a conservative and reasoned optimism, which, while feeling confident that conditions are getting better, does not fail to take account of some of the obstacles in the path. One of the facts that cannot be over-emphasized is that those entrepreneurs who first succeed, and succeed best, in reducing their costs of production will be the ones who will reap the first and greatest benefit in the new industrial day which is dawning. The general level of prices is likely to decline for some years to come; a few commodities now very low will advance, but many more will decline greatly. Hence, success must lie in the direction of reduced costs of production. This does not necessarily call for reduction in wage rates, though in some industries reductions may be justified, but it does call for increased efficiency on the part of employees and managers. The search for increased efficiency and lower costs of production will undoubtedly result in new methods of organizing the production and distribution of commodities and will lead to the adoption of labor-saving and other cost-saving devices on a large scale.

Since the reduction in costs is mainly obtained by the effective use of machinery, it is probable that the machine-tool making plants and industries associated with them will feel the effects of the business revival earlier than some of them now anticipate. American industrial genius, which is proverbial, has always manifested itself by a willingness to scrap equipment, regardless of its condition, if something which will make possible more effective production is available. The existence, therefore, of considerable numbers of machines does not mean necessarily that the machine-making industry must face a long period of depression.

Nor, paradoxically, will the increased use of cost-saving machinery mean greater unemployment for labor. Such laborers as are displaced by the machinery introduced will be employed either in the machine-making industries or in other industries which are stimulated by the prosperity in these and allied lines. On the other hand, those laborers who remain in their original employment will turn out a much larger product than was possible before because of the use of machinery. This will make possible not only the maintenance of existing wage scales but even an increase above the present level. The prosperity of these workmen will lead to demands for all sorts of commodities and thus will stimulate production in other lines until the slack which at first results from the introduction of labor-saving machinery is entirely taken up. There will then be increased demand for labor of all kinds. The new prosperity, thus based upon the more effective use of the factors of production, will be more far reaching and more firmly established than any that has gone before.

Evidence Used to Determine Currents of Business

The evidence upon which an attempt to determine the currents of business is based must vary with the particular purpose one has in view. For example, if we seek knowledge of current business conditions, we consult certain data. If, however, we desire information, not so much of existing conditions as of future developments, we turn to other sources. Much confusion arises in connection with attempts to determine business movements because the observer fails to dis-

*Professor of finance, college of engineering and commerce, University of Cincinnati.

tinguish between the kinds of information which may be regarded as anticipatory and those which may be considered as reflecting current conditions.

The writer suggests the possibility of grouping the various kinds of information under three main heads: (1) Financial data; (2) industrial or production data; and (3) commercial or trading information. It is suggested also that the fundamental importance of these three groups is in general indicated by the order in which they have been named. That is to say, if it be desired to make an estimate of probable business developments, much more valuable guidance can be secured from the study of facts concerning financial conditions than from those facts brought together under the other two heads. The industrial and commercial data indicate the *present* condition of business rather than its *future* prospects, although they do throw some light on the latter.

The general purpose of assembling information under the head of financial conditions is to ascertain so far as is possible the present and prospective state of the capital supply with a consideration of the demand for such capital. Obviously there can be no improvement in the industrial or commercial situation unless the funds available for industry are being accumulated in adequate amount. Hence the kind of information to be considered under this head is that which shows the tendency of the capital supply either to increase or decrease. Significant information on this point can be obtained by considering the following topics:

(1) Trend of savings bank deposits
(2) Trend of bond prices
(3) The discount rate for high grade commercial paper
(4) The liquidation of loans
(5) The volume of Federal reserve notes outstanding
(6) The Federal reserve ratio of reserve to note issues and liability to depositors
(7) New issues of securities contemplated
(8) Government finance—expenditures, taxation, funding

Conditions are noticeably better than they were at the close of 1921. Those producers who can get their costs of production down to a level which will allow them to sell their output at gradually lowering prices will undoubtedly be able to close their books for 1922 with a gratifying profit.

Determining Industrial and Commercial Conditions

Industrial or production data furnish evidence as to the condition of industry at the present time. Such information is valuable not only for the purpose of providing some way of estimating existing industrial conditions but also because a knowledge of *present* industrial conditions will enable us to foretell *coming* commercial or trade conditions. This must be evident since the power to buy and sell rests upon the production of goods. Goods must be produced before they can be bought and sold, and the purchasing power of consumers depends in the last analysis upon the volume of goods they have produced. Their money wages which they spend merely represent an approximately equivalent value of the goods they produce. Hence activity of a commercial nature, buying and selling, shipping and speculating, must be preceded by betterment of the industrial situation. A great deal of information may be obtained which is useful for determining present industrial conditions. The most suggestive may be assembled under the following heads:

(1) The extent of unemployment
(2) Wage difficulties
(3) The volume of production in such lines as (a) agriculture, (b) iron and steel, (c) coal, (d) oil, (e) lumber, and (f) railroad equipment
(4) The consumption of water and electric power
(5) The number of business failures and the amount of liabilities

The information concerning commercial conditions may well be ascertained from a study of the following topics:

(1) The trend of general prices and a comparison with each other of prices of various groups of commodities
(2) The volume of retail trade
(3) Bank clearings
(4) Stock market operations
(5) Car loadings; idle cars
(6) Foreign trade—exports, imports, and balance of trade; tariffs, and their effects
(7) Foreign exchange rates; the economic situation of foreign countries

The general reasoning involved is that there must be improvement in underlying financial conditions, especially those relating to the capital supply, before there can be any improvement in industrial conditions; that there must be improvement in industrial conditions before there can be any permanent improvement in commercial conditions; and that when commercial conditions improve as the result of the financial and industrial betterment, the increased volume of buying and selling will in turn further strengthen the financial situation. The process is repeated until failure to come up to increasing requirements causes a halt in one of these stages and paves the way for the impairment of all. In this article effort is made to set forth in general terms the evidence upon which it is now frequently asserted that business conditions are improving. In a subsequent article the statistical verification of this claim will be presented in accordance with the theory and plan just outlined.

Notable Increase in Savings Deposits

The evidence of improved financial conditions since the beginning of the year is found, first, in the increase in savings bank deposits. The index for the volume of savings in 30 representative savings banks in the New York Federal reserve district is well above that of any previous period. Although a slight decline occurred between Jan. 10 and Feb. 10—a result of the withdrawals normally following the crediting of interest as of Jan. 1—the volume of deposits is still noticeably higher than at any preceding period.

The same trend is indicated by the reports for postal savings. The past few months have shown a gradually smaller decline in the volume of deposits and during February this was turned into an increase in deposits over withdrawals for the first month since January, 1921. This information is compiled from all sections of the country and hence indicates the reality of the improvements which have been reported in industrial conditions.

The trend of bond prices similarly shows an increase in the amount of capital available for industrial and commercial enterprises. During the last week of January, the Treasury offered a series of notes for the purpose of refunding some of its short-dated debt. The notes were heavily oversubscribed, although they bore interest at 4¾ per cent as compared with 5½ per cent on a similar issue last September, and 5¾ per cent on such an issue in June, 1921. New securities offered by corporations have been in large volume and have been eagerly taken up at lower rates in what is described as a phenomenally strong bond market. The supply of funds for investment is growing so rapidly that there is a strong investment demand not only for

bonds but for such high-grade preferred stocks as United States Steel, and even for well established dividend paying common stocks, such as American Telephone & Telegraph.

Other Significant Aspects of the Financial Situation

There has been reduction in the volume of credit required for commercial purposes, and the rate prevailing for high-grade commercial paper varies in different sections of the country from 4½ to 5 per cent. Liquidation is going on steadily if not rapidly. The greatest progress recently has been made in the agricultural districts where the improved prices for farm products have encouraged the marketing of such commodities. There is still a large volume of frozen credit both in the industrial and agricultural sections of the country. On this account it would be extremely ill-advised to adopt any such proposal for the payment of a bonus as is represented by the scheme to give the soldiers some form of collateral which they could presumably use as a basis for loans from the banks. The banks should not and cannot take the Government's place in paying such a bonus. The reserve position of the Federal reserve system continues very strong. The latest ratio of total reserves to deposits and Federal reserve note liabilities combined is reported as 75.6 per cent.

One of the important financial factors that is retarding business recovery is the uncertainty as to governmental policies in regard to taxation, expenditures and funding. With nearly six billion dollars of public debt falling due in the next year and a half, it is important that expenditures which are not absolutely essential be eliminated, and that this economy be supplemented by wise measures of taxation. Unfortunately the Administration, so far as its policies can be judged by Congressional attitude, has given the business man no confidence that these fiscal problems will be handled wisely. The President and the Secretary of the Treasury undoubtedly entertain much sounder notions in these matters than do the Republican majority in Congress; but the best that they can do seems to be to put difficulties in the way of the enactment of unsound measures by this majority. The result is that little is accomplished.

Doing Business with Canada Handicapped

A good example of the harm that can be done by legislation adopted for political effect without regard to economic principles can be seen in the effect of the so-called "emergency tariff" upon the trade between the United States and Canada. During 1921 the total imports from Canada fell over $200,000,000 as compared with 1920, while our exports to Canada decreased about $400,000,000. Allowing for the decline in the price level, there was a decline in our exports to Canada and our imports from her of approximately 45 per cent. So long as we refuse to admit Canadian products except under the imposition of a high tariff, we are reducing the purchasing power of Canadians and the possibility of exporting to them.

However, it is not only from the immediate financial point of view that this legislation is harmful. The interference with the trade between the two countries has produced in Canada a strong reaction in favor of British products. The United States was for some time Canada's leading customer, but now since we are forced to keep down our purchases from her, and since England has displaced us as her best customer, the Canadians are buying much more heavily from the United Kingdom than formerly. The general advice in Canada is: "Buy in Great Britain whenever possible anything that can't be produced in Canada." Because of the hostility engendered against the United States in a business way, the Canadian government is making an effort to secure closer relations with British industry. A book has recently been issued entitled, "Canada as a Field for British Branch Industries," and is being widely circulated in Great Britain. Progress toward business recovery would be very much hastened if legislation in regard to the tariff, the bonus, taxation, and the funding of domestic and foreign loans were intelligently disposed of.

Improvement in Employment

Industrial conditions show an uncertain trend, with some industries still in a much depressed condition and others in a very satisfactory position. The volume of unemployment which has been extraordinarily large for the past ten months is being reduced. The employment service for the Department of Labor in Washington reports that employment has increased in all industries except textiles. The basic industries—food, iron, steel and metal products, railroad repair shops and automobile plants—all show substantial increases in number of employed.

Out of 65 cities considered, increases in the number of employed were reported in 44 cities. The New York State Industrial Commission reported on March 12 that there was an increase in the number of employees in practically all industries in New York State. Throughout the steel manufacturing districts in Ohio reports of increases in operation have been recently of almost daily occurrence. From the automobile manufacturing centers of Ohio come reports of increased demand for cars and increased operation of plants. This may be merely seasonal, but in any event it offers employment in a period when the demand for laborers would otherwise be at a low ebb. In the near future the agricultural demand will make itself felt and thus further reduce the volume of unemployment.

Other Factors Affecting the Industrial Situation

Wage difficulties and other labor problems are still hampering production in some lines. Notable among these is the strike of the textile workers which has brought the cotton manufacturing industry in New England almost to a standstill. The threat of a coal strike on the first of April is likewise acting as a depressing influence. The consumption of power in industrial establishments indicates an increase in the activity of such plants, although the volume of production in most lines is still below normal. Among the most gratifying proofs of improvement in the industrial situation is the increased production in the iron and steel and railroad equipment industries. As earnings and new financing permit, the railroads are certain to come into the market with large orders for equipment of all kinds. The advance in the prices of the shares of steel and equipment companies indicates that shrewd observers of business conditions are convinced that railroad buying on a large scale will not be long postponed.

Commercial failures which were very high throughout 1921 and through January and the early part of February this year have shown a tendency to diminish. If this tendency is maintained for the next month or two it may be assumed that most of the weak concerns have been squeezed out and that thereafter little fear need be felt that failures will be on a scale large enough seriously to retard business growth.

Commercial Conditions Not Yet Satisfactory

In considering information relating to commercial conditions the showing is less satisfactory. The downward trend of prices generally seems to have been halted temporarily. While this makes for immediate stabilization, it postpones the ultimate adjustment which must be made on a lower basis. Some commodities, which were too low in comparison with others,

notably farm products, have registered an advance. This has engendered a more optimistic feeling in the agricultural regions and has brought about an improvement in those industries which are immediately dependent on agricultural buying, such as the mail order houses and the manufacturers of agricultural implements and supplies.

The index numbers for prices of various groups of commodities as computed by the Department of Labor still show wide variations between the prices of the various groups. Lumber and building materials, house furnishings, fuel and lighting, and clothing are still far out of line. The fact that resistance to an inevitable price decline works to the disadvantage of an industry is shown by the unsatisfactory position of the furniture trade. The index number for housefurnishings advanced farther above normal than that of any other group of commodities, and it has been held more persistently at its high level. As a result it has been reported that the annual midwinter clearance sales of furniture are very disappointing, and that this decline in the volume of furniture sales was largely responsible for the total decline in sales registered by the department stores during January and February. The monthly business summary of the Philadelphia reserve bank for the first of March designates both the demand for furniture and the collections for furniture sold as poor. The reports on retail sales in department stores for January, 1922, indicate a falling off as compared with January, 1921, of about 8 per cent in value, although if allowance be made for price declines it is probable that there was a small increase in the number of individual transactions.

Sales of securities on the stock market show considerable strength and activity both in the number of shares sold and in the gradual advance in prices.

A favorable exhibit which throws light on current activity is found in the increase in car loadings. Although an increase would normally not occur until March, this year it began several weeks earlier. The weekly car loadings in February averaged 800,000 cars. This is about six weeks in advance of the normal rate of loadings. Freight is being moved not only in increasing quantity, but also under lower operating costs than a year ago.

Bank clearings, as might be expected, are considerably below normal, for while underlying conditions are showing constant improvement, actual every-day transactions are still very much retarded.

Not only domestic trade, but also foreign trade, is relatively inactive. There has been a decline in the value of both exports and imports, but the rate of decline has been greater in exports than in imports. An interesting feature of our export business is the tremendous increase in the exportation of corn. Before the war corn was relatively unpopular as an export commodity, but in the seven months ended January, 1922, more than 90,000,000 bu. were exported. This is more than six times the volume exported a year before. Evidently large new markets are being developed for this grain. This, of course, improves the farmers' situation very considerably.

Another favorable indication from the commercial point of view is found in the rise of foreign exchange rates. There has been a marked advance in the price of sterling, and along with this has come improvement in most of the other currencies. Such improvement in the rates of foreign exchange not only increases the potential purchasing power of our foreign customers and stimulates our export business, but it suggests betterment in the internal economic condition of these countries.

There are other developments among the European countries which support the evidence of the exchanges. There have been since the first of the year important reductions in the bank discount rate; in Norway the rate has been reduced from 6½ to 6 per cent, in Sweden the reduction has been from 5½ to 5 per cent, and the Bank of England recently announced the reduction of its rate from 5 to 4½ per cent. This last is the lowest rate which has prevailed in England since the week before the war began. There has recently been an announcement by the Chancellor of the Exchequer that the government intends to restore an unrestricted market for gold at the earliest possible date. Further evidence of improvement in the English economic situation is found in the upward movement of gilt-edged securities on the London exchange which has attained something in the nature of a boom. Treasury bonds are now selling several points above their original issue price. Bank of England stock, which last year fell to 163½, has advanced to 200. All the prior lien stock of the railroads has risen substantially.

Conditions in France are reported as very much better, and progress in readjustment is even reported from Germany. All in all, while much unsettlement still exists in the foreign situation, and a long road must still be traveled before we can count on selling goods to Europe on anything like the old terms, it is safe to say that each month has brought some improvement.

All the evidence indicates that conservative optimism is justified. Conditions are noticeably better than they were at the close of 1921, and those producers who can get their costs of production down to a level which will allow them to sell their output at gradually lowering prices will undoubtedly be able to close their books for 1922 with a gratifying profit.

Waste Material Dealers Hold Meeting and Dinner

The annual meeting of the National Association of Waste Material Dealers, New York, was held March 15, at the Hotel Astor. Frank C. Overton, Castle, Gottheil & Overton, New York, was re-elected president; Harry R. De Groat, of Philadelphia, first vice-president; James Rosenberg of New York, second vice-president; Fred Mayer of St. Louis, third vice-president. Charles M. Haskins is secretary of the association.

At the ninth annual banquet in the evening, the Rev. Percy Stickney Grant, rector Church of the Ascension, New York, the Hon. Carroll L. Beedy, congressman from Maine, and Willard Scott, Brookline, Mass., spoke. Dr. Grant pointed out the great necessity for better education as a cure for industrial unrest. Mr. Beedy's subject was "The Money Puzzle." He quoted the statistics covering United States indebtedness, European indebtedness, interest costs on these debts, proportion of the world's gold supply held by the United States prior to the war and now and the average value of paper before and since the war. Maintenance of the gold standard, he said, is to-day dependent upon Britain and America.

Prizes Offered for Foundry Devices

In October, 1920, a gift of $1,000 to the American Foundrymen's Association was made by the S. Obermayer Co., the interest on which is to be awarded for devices which will aid foundries in their work. The devices for this year, in the shape of models or drawings, will be on exhibition at the annual convention of the association in Rochester, N. Y., during the week of June 5.

The contest is limited to foremen or other workers in foundries or in other departments of plants operated in connection with foundries. Particulars of the contest will be furnished by the secretary of the association, 140 South Dearborn Street, Chicago. The jig or other equipment entered in the contest shall not be patentable, but shall be such a device as can be constructed in any foundry and used in the production of castings, or in core making, molding, pouring or handling operations.

SHIPPING BOARD EQUIPMENT

Increased Demand Believed to Reflect Improved Business Conditions

WASHINGTON, March 21.—While from a spectacular point of view wrecking of the more than 100 large buildings used as storehouses, offices, etc., at the Harriman, Pa., headquarters of the United States Shipping Board Emergency Fleet Corporation has aroused current interest, from an industrial point of view the interest is of another character. This relates to the various uses to which the material being disposed of at the yard by the Emergency Fleet Corporation is being put. Large quantities of equipment already have been sold, but there still remains considerable to be disposed of. According to an announcement by W. P. Willetts, manager of sales, material sales division of the Emergency Fleet Corporation, with headquarters at Harriman, the generators which have been sold are being used by manufacturers, and the air compressors are being sold to large general contractors and tunnel builders. He said that one of the features of the wrecking of the yard will be the tearing down of the wooden ship runways, and the large steel cranes and craneways which formed the 12 shipways.

The work of salvaging lumber has started and the purchaser of the steel craneways is organizing a force of men preparatory to salvaging the steel. Approximately $450,000 worth of materials have been disposed of within the last three months and a force of 100 laborers is engaged in tearing up the railroad tracks, dismantling the cranes and skidding the machinery, preparatory to its shipment.

Although the largest structures have not as yet been sold, Mr. Willetts thinks that they will be disposed of in the near future.

The plate and angle shop, in which at one time the major portion of the local fabricating work on 40 steel ships was done, has been dismantled and the machines have been removed and made ready for distribution to various localities in the United States. Some of the most desirable machinery is still awaiting purchasers. The locomotive cranes, 50 and 60-ton portal pier cranes, and shipway cranes, are rapidly being dismantled for removal and sale.

Among other equipment still to be liquidated are 10 and 15-ton gantry cranes; air compressors, steam-driven, with a capacity of 1950 and 5715 cu. ft. per min.; 100-lb. air compressors; tool steel, including carloads of hand tools; rivets; hammers, drills, heaters; eight Erie city boilers with mechanical safeguards and coal-handling apparatus; welding and cutting machines; electric testing machines and service equipment.

Mr. Willetts says that business conditions have shown a decided improvement and that buyers from all sections of the country, representing nearly every phase of industry, are purchasing equipment.

Cost of Living Slightly Higher

Monthly figures of the Bureau of Labor Statistics show the wholesale prices of all commodities during February to be 51 per cent above the average for 1913, compared with 48 per cent in January and 49 per cent in both December and November. Three of the nine individual groups showed a rise in January compared to December, these being farm products, with 10 points; food, etc., with 4 points, and miscellaneous, 4 points. Metals and housefurnishings showed decreases of 2 and 1 points, respectively.

Metals and metal products, which now stand at 15 per cent above the 1913 average, are far lower than any other group listed. This item is now 11 points below farm products, and more than 20 points below any of the others. The highest item on the list still continues to be housefurnishing goods, which, together with building materials, are more than double their 1913 prices.

Our table shows the figures for the two most recent months and for February, 1921, and the peak in 1920. It shows also the amount of liquidation, between the 1920 peak prices and the present, of the excess of the peak prices over the average of 1913. Metals have been liquidated to a greater extent than any other group.

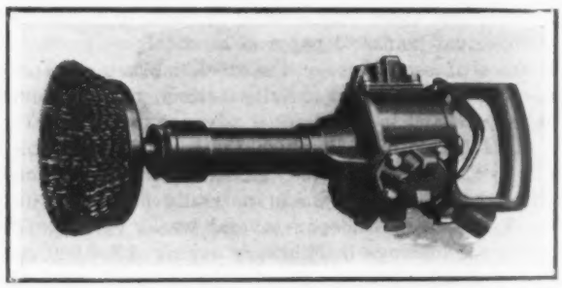
Index Numbers of Wholesale Prices, by Groups of Commodities
(1913 equals 100)

	1920 Peak	1921 Feb.	1922 Jan.	1922 Feb.	Liquidation, Per Cent
Farm products	246	129	116	126	82.2
Food, etc.	287	150	134	138	79.7
Cloths and clothing	356	198	183	183	67.6
Fuel and lighting	284	218	183	183	54.9
Metals and metal products	195	146	117	115	84.2
Building materials	341	221	202	202	57.7
Chemicals and drugs	222	178	159	159	51.6
House-furnishing goods	371	277	214	213	58.3
Miscellaneous	247	180	146	150	66.0
All commodities	272	167	148	151	70.4

High-speed Wire Brush Cleaner

For cleaning metal surfaces the air-driven wire brush machine shown in the accompanying illustration, having an average free speed of 4200 r.p.m. at 90 lb. air pressure, has been added to the line of the Ingersoll-Rand Co., 11 Broadway, New York.

Among the uses for the machine may be mentioned the removal of paint, rust, dirt and scale from tanks, steel cars, structural and other steel. It may be also used for cleaning iron and steel castings. The wire brush, turning at the high speed, is said not only to clean faster but to be more durable in severe service than if revolving at only 2000 to 3000 r.p.m. As an example of its performance it is claimed that on a six-weeks' test, the machine cleaned steel gondolas, each averaging 540 sq. ft. surface, in 3½ hr., and all-steel box cars, averaging 1400 sq. ft. surface each, in 7½ hr. It is further claimed that the brush removed not only all the rust but the old paint as well.



High-Speed Wire Brush for Cleaning Metal Surfaces

The machine is shown in the accompanying illustration. It is known as the Little David No. 601. The air motor is of the three-cylinder type used in the company's Little David portable grinder. Light weight has been attained by using an aluminum casing reinforced with cast-in steel brushings. The weight complete is 14 lb. and the length over all 17½ in. The diameter of the wire brush is 6 in.

Following announcement that the car repair work of the Western Maryland Railway, Baltimore, at the shops in Baltimore and Elkins, W. Va., had been abandoned and placed on contract, and also the anouncement that the railroad's maintenance-of-way work had been placed in the hands of Dickson Construction & Repair Co., Youngstown, Ohio, the company has now announced that the shops at Hagerstown, Cumberland, Connellsville and Hanover have been placed under the control of the Youngstown company.

The National Carbon Co., 30 East Forty-second Street, New York, has issued an attractive booklet, "The Carbon Electrode," which gives data concerning the manufacture, use, handling, etc., of various kinds and sizes of electrodes for its different electric furnaces. The electrical phase arrangements of various types of furnaces are included in graphic form.

Iron and Steel Industries of Europe

Reports to the Government Show Much Irregularity, but Improvement in Some Countries, Particularly in England and Germany

WASHINGTON, March 21.—The iron and steel industries abroad show an irregular condition, according to reports received by the Department of Commerce. While, like the United States, none of them is operating on a normal basis, there are notable instances of improvement. These relate particularly to England and Germany.

Improvement in British iron and steel exports was pointed out in THE IRON AGE of last week. This is also a matter of comment this week in Commerce Reports. Using somewhat different lists of items than those covered by THE IRON AGE, based on Board of Trade figures, the Government publication says that British iron and steel exports in January amounted to 234,446 long tons, a gain over December, 1921, of 45,683 tons. British iron and steel imports in January totaled 85,223, as compared with 13,406 tons imported to the United States.

American manufacturers are showing considerable concern over the recovery of the British export market, as compared with progress made in the same direction by domestic producers. Exports of American iron and steel in January amounted to only 160,920 tons. The outstanding takings of British exports other than those of its dominions overseas, which represented by far the largest tonnage were: pig iron—Belgium and France, over 4500 tons each, and Italy, 10,800 tons; plates and black sheets under ⅛ in.—Japan, 2700 tons; galvanized, plain, and corrugated sheets—Argentina, 12,800 tons; Japan, 2100 tons, and the Dutch East Indies, 1400 tons; tin plates—Japan, 4300 tons; the Netherlands, 1900 tons; France, 1600 tons, and China (including Hongkong), 1200 tons; rails—Argentina, 4800 tons. Iron and steel imported into Great Britain in January totaled 85,223 tons, a decline of 28,453 tons from December's figure. Exports for the month exceeded imports by 149,223 tons.

The Industries of Germany

The iron and steel industries in Germany reported a brisk month in January, despite greatly increased transportation difficulties. Prices are soaring. No pig iron and steel production figures are published, as a matter of policy, but it is understood that the steel output in January slightly exceeded the estimated combined production of England, France and Belgium. The industry is in need of scrap metal, hitherto an important factor in its raw materials. Stocks of scrap are now low and unless supplies are obtained from Poland, there will be felt a serious pig iron shortage.

Coal prices were raised on March 1 by between 106 and 159 marks per ton, lignite briquettes by between 71 and 87 marks per ton; thus, the present minimum price of Ruhr pit coal is 600 marks per ton and of lignite briquettes, 200 marks per ton, including 20 per cent coal tax and 1.5 per cent turnover tax. The maximum prices of pig iron and steel effective for March are as follows:

Hematite pig iron	4,744 marks per metric ton
Ingots	5,320 marks per metric ton
Blooms	5,770 marks per metric ton
Sheet bars	6,085 marks per metric ton
Billets	5,945 marks per metric ton
Shapes	6,920 marks per metric ton
Hoops	7,750 marks per metric ton
Wire rods	7,515 marks per metric ton
Thin sheets	9,375 to 9,690 marks per metric ton
Medium sheets	8,910 marks per metric ton
Thick sheets	7,805 marks per metric ton

Slow Improvement in Belgium

The last quarter of 1921 in practically all lines of Belgian iron and steel marked a continuation of the slow general improvement which first appeared in August and September, according to a report to the Department of Commerce by Acting Commercial Attache Cross. Between September and the end of December pig iron production increased 83 per cent, while the raw steel output practically doubled; the situation in rough castings is less favorable, with production figures stationary since July, 1921, in the neighborhood of 3300 tons monthly. Owing to some uncertainty felt as to the permanence of the revival, most plants have been slow to relight blast furnaces, with the result that only fourteen were in operation at the end of the year—five in Hainaut (Charleroi), four about Liege, and five scattering.

Despite this improvement, pig iron production in December was only 36 per cent of the 1913 monthly average and slightly under 80 per cent of the 1920 average.

Poor Business in Austria

Business was poor in most of the Austrian metal industries during the first half of 1921, but during the summer a more active demand began to make itself felt, and in the fall there was a real boom, according to a review of the year received by the Department of Commerce from Trade Commissioner Upson at Vienna. This was largely the result of the depreciation of the Austrian crown, but the fact that the competing German metal industry disposed of a large part of its goods at home and found a market for the rest in countries with a more stable currency also aided in the recovery of the Austrian indemnities. Czech competition has been excluded by the rise of the Czech crown.

Nevertheless, production still remains short of what it was in time of peace. Obstacles to a full capacity production are the diminished efficiency of the individual workmen and the eight-hour day. Efforts are therefore being made to induce the workmen to consent to longer hours. At the present time, all branches of the metal industry are doing a great deal of work for export, and with most of them it forms the greater part of their business. They are quite dependent on this export business, since they have to import a part of their raw materials and fuel and must pay for them in foreign currency at a high rate of exchange.

Depression in Sweden

At the meeting of the Swedish Iron Works Association, held during the last week of January, 1922, statistics of Sweden's output of iron and steel and its foreign trade therein for 1921 forwarded to the Department of Commerce by Commercial Attache Anderson at Copenhagen, show the extreme depression that has prevailed in this industry in Sweden during the past year. Production of pig iron in 1921 was 308,600, compared with a ten-year average of 642,700; of steel ingots, 219,100, compared with 601,400. On the whole, exports of iron and steel were only 29.3 per cent of the total for 1913, while imports, which amounted to 122,400 tons, as compared with 231,700 tons in 1913, were 52.3 per cent.

Conditions in Holland

The import trade in iron and steel in Holland during 1921 was unsatisfactory in nearly all lines, says Consul General George E. Anderson in a report to the Department of Commerce. The trade on the whole declined very materially from that of the years immediately preceding, and the decline told heavily against the United States. German competition has not been nearly so keen in most lines of imports into Holland as is generally supposed, but in iron and steel has been especially keen and effective.

The trade in general has declined as a result of depressed industrial conditions, particularly in the

shipbuilding and allied lines, which were the chief foundation for the very large trade in steel products during 1919 and 1920.

The well-established lead of German iron and steel makers in the Netherlands markets is made plain from official figures, but it was cut down somewhat during the latter part of 1921 when Dutch importers found they could not rely upon German deliveries and turned to the United States and other countries where they placed orders.

Better Times in Latin America

ERIE, Pa., March 21.—"A promising sun-rise glow of 'better times' is tinging the Latin American trade horizon. Most of the countries of this region have passed through the dark period of liquidation and are facing the 'breaking day' of business revival with renewed confidence," declared Dr. Julius Klein, director of the U. S. Bureau of Foreign and Domestic Commerce of the Department of Commerce, in a speech tonight before the Chamber of Commerce in this city.

Latin America will from now on present a steadily developing market for American products; significant evidence of its growing importance to us is found in the fact that our trade with that region to-day represents 18 per cent of our total trade with the world, against 13 per cent in the fiscal year 1913-14. Exports to Latin America from the United States during the calendar year 1921 amounted to over $800,000,000, a gain of 165 per cent over the last normal pre-war year.

"This is certainly a striking example of the ability of America to hold its own," Dr. Klein declared, "especially in view of the fact that this increase has been achieved in the face of extremely unfavorable exchange rates, complicated by world-wide depression and after fully two years have elapsed in which our old commercial rivals, the English, the German and the French manufacturers, have had time to enter into active competition against us. It means," the director asserted, "that in spite of a few noisy complaints our Latin American friends have learned to appreciate American quality and service, and that our business men have likewise learned that quality and service are the keys to commercial success the world over."

The importance of the Latin American markets in the eyes of official America is clearly indicated, said Dr. Klein, by the recent action of Congress in recommending a 70 per cent increase in the Commerce Department's appropriation for trade promotion work in that part of the world.

Referring to the subject of competition, the speaker dealt with the scare-head announcements of overwhelming German success in the markets of our Southern neighbors. He denied emphatically that Germany had even begun to reconquer these markets, much less drive American salesmen into the sea with prohibitively low price quotations. "Simple trade statistics answer this question to the satisfaction of most of our business men," the director said. "For the benefit of any skeptics on this point, the director declared that reports coming to the Department of Commerce indicate that our competitors are not only failing to dominate all of the business but that in some important lines of trade they have actually failed to make delivery on orders obtained. The strong German campaign which started in the Argentine, Brazil and Mexico, has suffered great checks through the inability of many German manufacturers to meet the promises of their salesmen as to deliveries and qualities, Dr. Klein added.

JURISDICTIONAL AWARDS

Action Taken By American Engineering Council —Features of Executive Board Meeting

The executive board of the American Engineering Council of the Federated American Engineering Societies met in Chicago, March 10. The committee on employment service reported a resolution "that the maintenance of an employment bureau by the council is not at this time advisable." After discussion, the council voted to discharge the committee and instructed the president to appoint a committee of five to consider the whole question and report to the board at its next meeting, which will be held at Pittsburgh in May.

The executive board received a report from Rudolph P. Miller, New York, its representative on the National Board of Jurisdictional Awards, stating that the United Brotherhood of Carpenters and Joiners of America has not been observing the decisions of the jurisdictional board and that the attitude of the carpenters was causing serious embarrassment to owners, architects, engineers, contractors and workmen in the building industry as well as being detrimental to the public interest. As a consequence of this report, the executive board adopted a resolution urging "that the members of the American Institute of Architects and of the F. A. E. S. insert in all specifications and contracts for building operations a stipulation that the decisions of the Jurisdictional Board shall be observed."

It was further resolved "that this resolution shall be enforced as expeditiously as possible, beginning with those localities in which the trouble appears to be the most acute and where action seems most urgent, and that all these signatories make special and united efforts toward securing general and complete compliance with all the decisions of the Jurisdictional Board." The resolution also recited "that as and when trouble in any locality is brought to the attention of any of the signatories such organization shall take the initiative in forming a general committee of representatives from all the signatories for the purpose of dealing with the situation in that locality."

One of the liveliest discussions of the meeting of the executive board arose from a resolution presented by Philip N. Moore, St. Louis, "that the president of the F. A. E. S. be authorized to offer the Secretary of War the service of a committee of disinterested distinguished and skillful engineers, to be selected by a committee of its executive board, for the purpose of making a thorough investigation of the geological, engineering and manufacturing possibilities of the Muscle Shoals power project; this committee to serve without compensation, save for necessary expense." The resolution was voted down.

The Great Lakes-St. Lawrence Waterway project came before the board, which decided that at present it was undesirable to take any action.

The general question of international engineering federation was considered in many phases and provoked a discussion in which the constitutionality of a proposal to admit the Engineering Institute of Canada to membership in the Federation, if formal application should be made, was the subject of a lengthy debate. The board adopted a proposal put forward by E. S. Carman, Cleveland, for the appointment of a committee "to consider and report upon the affiliation of other engineering organizations than those within the United States with the F. A. E. S."

Secretary L. W. Wallace reported that the membership of the Associated Engineers of Spokane had so increased that the association was now entitled to a representative on the council, J. C. Ralston being the appointee. The Engineers Club of Columbus has appointed John R. Withrow as its representative upon the council.

A report from E. J. Prindle, chairman of the patents committee of the council, commended the publicity efforts of the federation as a powerful factor in bringing about the success of the movement to reform conditions in the United States Patent Office.

The monthly statistical bulletin of the National Federation of Iron and Steel Manufacturers, Caxton House, Tothill Street, Westminster, London, S. W. 1, is now available for general circulation by subscription at 14s. per year. It contains iron and steel production and export data of the leading countries besides Great Britain.

Machine for Bending Tennis Racket Tubing

The bending of 7/16-in., 22-gage tubing to the shape required for metal tennis rackets is accomplished in two operations on the special machine developed for the purpose.

A straight tube is placed in the machine and bent around the form to the shape shown in Fig. 2. The bending is by means of two arms or cranks keyed to two vertical oscillating shafts which are driven through the worm gearing and a crank motion located underneath the table. The normal cycle of motions is bend, release and stop, the operator then removing the bent part and replacing with another tube.

After running through a lot of frames for the first operation, the bending tools are changed to those shown in Fig. 3. It will be noted that the rollers on the end of the cranks are removed and links are connected to the studs midway in the crank arms. These links are attached at the opposite ends to another pair of swinging arms terminating in small rollers which engage the tube. The large rolls, mounted on the cranks in the previous operation, are used as locating stops in the second operation. They are positioned so that the partly bent frame is located by the rollers midway on the form in the center.

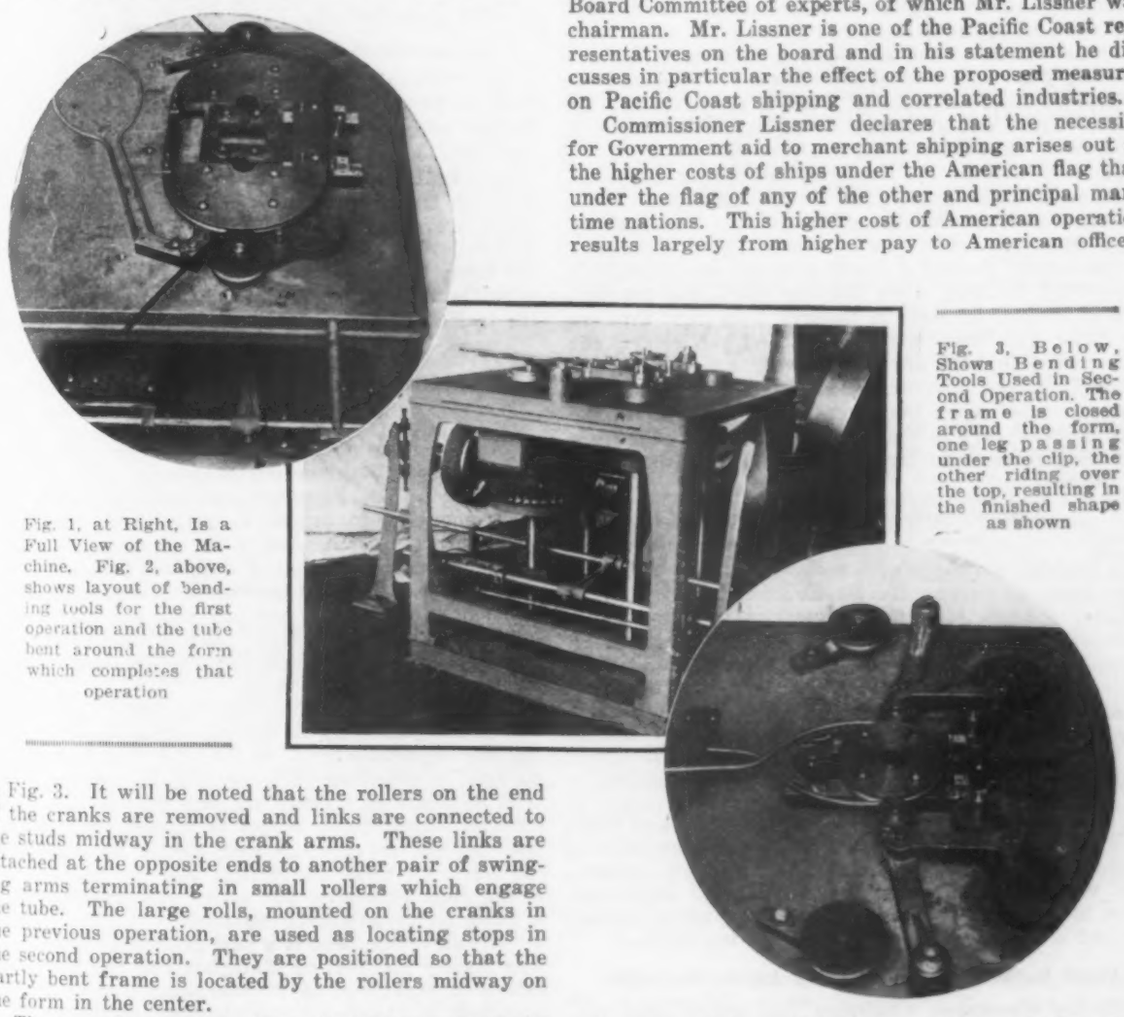


Fig. 1, at Right, Is a Full View of the Machine. Fig. 2, above, shows layout of bending tools for the first operation and the tube bent around the form which completes that operation

Fig. 3, Below, Shows Bending Tools Used in Second Operation. The frame is closed around the form, one leg passing under the clip, the other riding over the top, resulting in the finished shape as shown

The second operation closes the frame around the form, one leg of the frame passing under the clip at the left while the other rides over the top, resulting in the finished shape shown in Fig. 3. It is necessary, of course, to bend the frame through a greater angle of curvature than actually needed in order to overcome the spring and to set the metal in shape.

The machine illustrated is being offered by the Davis-Bournonville Co., Jersey City, N. J. It is said to operate at the rate of 600 bends per hr., the drive shaft running at 300 r.p.m. When working to normal production the operator starts and stops the machine for each bend. When facility in handling the work has been acquired, however, and maximum output desired, the machine, it is said, can be operated without stopping to insert the tubes and remove the bent shapes, the production being in this manner raised to about 1000 bends per hr.

The H. H. Robertson Co., Pittsburgh and Ambridge, Pa., recently was presented the Rice safety award for a 100 per cent record in accident prevention during 1921. This company employed 124 men, working 250,000 hours last year, without a lost time accident.

Earnest Plea for Merchant Marine

WASHINGTON, March 21.—Pointing out that without American ships to carry American products to customers everywhere, trade of this country in time of emergency will again be at the mercy of foreign competitors and that at any moment domestic interests are liable to suffer disarrangement of internal economy and the piling up again of our surplus products along the highways and railroads and at the ports, as happened at the outbreak of the World War, Commissioner Meyer Lissner has issued a statement discussing legislation regarding merchant shipping. He makes a vigorous plea for the upbuilding of the American marine through legislation recommended by President Harding, which was based on a report of the Shipping Board Committee of experts, of which Mr. Lissner was chairman. Mr. Lissner is one of the Pacific Coast representatives on the board and in his statement he discusses in particular the effect of the proposed measures on Pacific Coast shipping and correlated industries.

Commissioner Lissner declares that the necessity for Government aid to merchant shipping arises out of the higher costs of ships under the American flag than under the flag of any of the other and principal maritime nations. This higher cost of American operation results largely from higher pay to American officers and crew, higher subsistence costs, and higher fixed charges for interest, insurance and depreciation on "our admittedly higher ship values."

Welding Steel Ships

The success which has attended the building of a ship in which rivets were eliminated in favor of electric welding forecasts a radical change in steel structural methods, comments the London *Ironmonger*, March 4. In a paper on "Electric Welding Applied to Steel Construction, with Special Reference to Ships," recently read before the Institution of Mechanical Engineers, A. T. Wall recounted the successes achieved and difficulties encountered in the attempt to grapple with the many problems involved in the building of steel ships. The all-welded motor ship, Fullagar, the completion of which was largely due to the efforts of the late Sir George Carter, has demonstrated that an electrically welded ship can carry out successfully the work of a sea-going carrier. This ship has now been in service for 18 months, and has encountered heavy seas, even receiving a minor indent on her side, but the welding has not started.

RAIL FAILURES

Discussed by Railroad Engineers—Good Showing of 130-lb. Rails

The American Railway Engineering Association held its twenty-third annual convention at the Congress Hotel, Chicago, on March 14, 15 and 16. The total registration was 687 members and 172 guests, or a combined total of 859, as compared with an attendance of 815 last year. New members added during the year just closed totaled 129, bringing the entire membership up to 1960. Simultaneous with the convention an exhibition of railroad supplies and materials was held at the Coliseum, Chicago, under the auspices of the National Railway Appliances Association. There were 176 exhibits in the hall.

New officers of the engineering association for the ensuing year were elected as follows: President, J. L. Campbell, chief engineer El Paso & Southwestern, El Paso, Texas; vice-president, G. J. Ray, chief engineer Delaware, Lackawanna & Western, Hoboken, N. J.; treasurer, George H. Bremner, consulting engineer, Chicago, and secretary, E. H. Fritch, Chicago.

The report of the committee on rails was read by G. J. Ray, chairman. Rail failure statistics included in this report showed a continuous decrease in failures from 1908 to 1914, when the low point was reached, and a gradual increase in failures from that time up to 1917. The "war-time" rollings and particularly the rails rolled in 1917 are not showing up so well, due probably to the unfavorable manufacturing conditions that prevailed when they were made and also to the lack of usual care in the track that the railroads were able to give them during that time. The statistics are as follows:

Average Failures Per 100 Track Miles

Year Rolled	Years Service 0	1	2	3	4	5
1908	.....	.....	.....	.....	.....	398.1
1909	.....	.....	.....	.....	224.1	277.8
1910	.....	.....	.....	124.0	152.7	198.5
1911	.....	.....	77.0	104.4	133.3	176.3
1912	.....	28.9	32.1	49.3	78.9	107.1
1913	2.0	12.5	25.8	44.8	69.5	91.9
1914	1.2	8.2	19.8	32.9	50.9	74.0
1915	0.7	8.9	19.0	34.2	53.0	82.4
1916	1.6	11.8	29.2	47.7	70.6	.....
1917	5.3	21.6	38.9	66.0	.....	.....
1918	1.6	8.9	27.6	.....	.....	.....
1919	2.0	14.8	.....	.....	.....	.....
1920	3.9	.....	.....	.....	.....	.....

A recommended schedule for the inspection of steel rails was submitted for inclusion in the association's manual. Under this recommended practice inspection will be taken care of by a chief rail inspector, three or more assistant inspectors, a number of checkers and a chemist. The duties of each are outlined.

Piped Rather Than Segregated Ingots for Rails

In the discussion, Chairman Ray stated that the committee had paid particular attention to mill practice at various mills during the past year and as a result of these studies thought it best to prepare a new specification or to revise the old rail specification with a view to eliminating segregated steel so far as possible. He stated that a segregated rail is a dangerous rail compared with a piped rail, or a rail which has a natural lamination in the center due to the cavity in the top of the ingot. The committee is of the opinion that most of the trouble is due to split-head rails which are caused by bad segregation. Therefore, the new specification is being gotten up with the idea of producing an ingot which will contain what is known as piped steel, rather than segregated steel. Not that the railroads are looking for piped steel, but rather they wish to get away from segregated steel and want to give the manufacturer an opportunity to do that.

In touching on the same subject, C. W. Gennet, Jr., Robert W. Hunt & Co., Chicago, stated that experience has demonstrated repeatedly that the most constant cause of criticism of rails is the incessant fault found with the action of A or top rails in the track. It is plain that, until the mills generally adopt some method of casting hot-top and big-end-up ingots, the liability of obtaining piped and segregated unhomogeneous steel in the top rail is so great as to require the adoption of more positive methods for combatting the difficulties.

Rail Metal A for Tie Plates, Etc.

Testing the top rail of each ingot is one method for protecting against the shipment of inferior metal. In lieu of such testing methods it has now been deemed practicable to provide for the disposition of the A rail metal by agreeing to its use in the form of hot worked tie plates. In fact, a new rail manufacturer, who has just entered the field, has provided facilities for the disposition into other products, including tie plates, of what would ordinarily be the A or top rail metal. It is hoped, Mr. Gennet said, that early in the future more mills may see their way clear to adapt themselves to such manufacture.

Good Records of 130-lb. Rails

W. C. Cushing of the Pennsylvania System indicated how the adoption of heavier rail sections was affecting failure records. He stated that it has been estimated that the 130-lb. rail on the Pennsylvania System outlasts the 100-lb. section by two and a half times and is worth 23 per cent more in reduced maintenance on heavy curvature districts. It has also been established that failures of 130-lb. rail on the Pennsylvania System are many times fewer than those of the 100-lb. section, notwithstanding the fact that they are located where the traffic and alinement conditions are the severest.

Government and Industry Co-operate in Standardization

At the request of Secretary of Commerce Hoover the American Engineering Standards Committee has designated A. A. Stevenson, the retiring chairman of the committee, to act as a special representative to work with the department in the co-operation between the department's division of simplified practice and the engineering standards committee. The work of the division of simplified practice was organized in the latter part of 1921. More than a hundred national organizations are participating through representatives officially designated by them.

The American Engineering Standards Committee is maintained jointly by 29 national organizations, including five departments of the Federal Government, nine national engineering societies and 15 national industrial associations. There are now similar national industrial standardizing bodies in thirteen foreign countries, all but one of which were formed during or since the war. Of these the British and the German work is the most extensive, but active and important work is going forward in other countries.

Mr. Stevenson, who is a past president of the American Society for Testing Materials and has had a most extensive experience in standardization work, is vice-president in charge of manufacture, of the Standard Steel Works Co., which is a subsidiary of the Baldwin Locomotive Works.

Started on Open Shop Basis

The Wheeling Steel Corporation has succeeded in starting up some of its sheet mills at its Beach Bottom, W. Va., works on an open shop basis after a shutdown of about nine months. This company declined to renew its agreement with the Amalgamated Association of Iron, Steel and Tin Workers in June, 1921. Efforts made to keep the Beach Bottom mills in operation on an open shop basis were unsuccessful and, business being poor, it was decided to shut down the mills. Some trouble marked the resumption, but since the first night the situation has been quiet. At the Yorkville, Ohio, works of the company, where the company is operating on an open shop basis, eight of the 24 hot mills now are on.

The Lindstrom Tool Co., Bridgeport, Conn., recently employed 150 additional hands in its toy manufacturing department, and will shortly put on 100 more, owing to several large orders recently received.

BETTER PLANT OPERATIONS

Improved Bank and Labor Conditions in Youngstown—Production Increased Moderately

YOUNGSTOWN, March 21.—Improved sentiment is unquestionably spreading in this center among iron and steel executives and banking interests. Production is being accelerated in a moderate way. The Youngstown Sheet & Tube Co. has blown in "D" blast furnace in its East Youngstown group, giving it three active stacks out of six, and increasing the total number of operating furnaces in the Mahoning Valley to 13, of 26. Finishing mills are averaging 55 per cent, with units devoted to the lighter products on a larger scale. Heavy steel production is still restricted.

But for the coal strike threat, additional stacks would be blown in. The Struthers Furnace Co., Cleveland, operating a merchant furnace at Struthers, Mahoning county, is preparing to start production as soon as unsettlement arising from the coal situation disappears. Both the Republic Iron & Steel Co. and the Brier Hill Steel Co. will likely blow in additional furnaces when this situation is cleared up. The former has two furnaces pouring and the latter one.

The Newton Steel Co., operating an electrically-driven sheet plant consisting of eight stands of roughing mills and eight stands of finishing mills at New Falls, Trumbull county, is contemplating an addition of six mills. This company has been in exceptionally good operating position for the past six months, fully 90 per cent of its output consisting of deep drawn stock which has proven acceptable as automobile body material. Its capacity is occupied fully 45 days ahead. No decision has yet been reached, however, to proceed with the additional capacity, but if demand warrants and business conditions continue to improve, the units may be installed this year.

New Orders Being Received

Consumers are not yet placing future tonnages with any degree of freedom, but mills are able to operate on week-to-week business with assurance that new orders will replace those being rolled. An indication of the situation is found in the fact that a recent appraisal of unfilled tonnage of the Sharon Steel Hoop Co., Sharon, Pa., showed no orders in excess of 100 tons, in a total volume of 16,000 tons. An independent at Youngstown, with 28,000 tons of unfilled orders at the close of last week, reports most of the business is in small lots, for which prompt shipment is desired.

An encouraging feature of the local situation is the increase in commercial bank deposits, which gained $1,581,441, to $42,321,118, during the 10-week period from Dec. 31 to March 10. Another significant factor is the seeking of loans due to enlarged demands for working capital by interests which had largely liquidated their bank indebtedness at the close of the year. Withdrawals from savings accounts at this time are insignificant as compared with the demand last summer and fall.

Bank statements are regarded as very satisfactory in view of withdrawals before March 10 for industrial payrolls and the recent payments of income, real and personal property taxes. A combined banking institution with close connections with the major steel groups in the Valley, reports liquidation of loans during the past ten weeks aggregating $1,500,000.

"One of the encouraging features of the current situation is that stocks of steel supplies in hands of consumers are largely exhausted," states an independent executive. "Buying is in small lots, but is sufficient in the aggregate to give producers a fair tonnage volume. A larger volume of buying from regular sources is to be expected in view of these conditions.

No More Shrinkage of Inventories

"Further loss due to shrinkage of inventories is unlikely in this district, as Valley plants have made generous allowances for such depreciation. The earning situation will likewise improve as schedules expand, thus proportionately reducing overhead costs per ton."

Another executive states: "Liquidation is ended for the time being and we are trending upward. A definite turn has undoubtedly been reached in the market. Problems remain to be solved, of course, but never at any time, even when business was considered good, was the steel industry wholly free from troublesome factors."

The A. M. Byers Co., Pittsburgh, is planning to suspend its Mattie blast furnace at Girard, Ohio, during the next three weeks, owing to accumulation of iron. By that time its ore yard will have been cleaned up and the company is buying additional tonnage. It will continue to operate its puddle furnaces at Girard on piled iron.

Sheet & Tube Company Operations

The Youngstown Sheet & Tube Co. has seven pipe mills on the active list, almost double its recent operating rate, while the Republic Iron & Steel Co. has four pipe furnaces fired. Valley sheet mill capacity is occupied to the extent of about 60 per cent. The Trumbull Steel Co. is operating all departments of its Trumbull and Liberty plants virtually at normal on tin plate, sheets and strips. The Falcon Tin Plate Co. is operating its recently acquired Canton property at 75 per cent, as compared with a recent schedule averaging 60 per cent. Following a suspension of several weeks, the Mahoning Valley Steel Co. resumed this week at its Niles plant, with six mills scheduled to roll tonnages covered by mixed orders for black and galvanized sheets.

Three merchant bar mills are being operated by the Republic company, chiefly on light bar business. Secondary steel establishments, such as the Truscon Steel Co. and the General Fireproofing Co., are expanding operations to meet improved requirements for their products.

In the Shenango Valley employment conditions are appreciably improved, due to enlargement in operations at the plants of the Carnegie Steel Co. and the American Sheet & Tin Plate Co. The latter interest is operating 62 of 100 hot mills at its Farrell and New Castle works.

Sales executives in the two Valleys do not regard current buying activity as a "flash-in-the-pan" movement, but one backed by sustaining influences.

Stabilization of wire products prices has stimulated buying in this division and has been responsible for enlarging active capacity to 75 per cent in this district, as compared with a level of 50 per cent, which was maintained for some time previous. Wire nails spread from $2.40 to $2.50 per base keg, while plain wire is generally held at $2.25.

The Barney & Berry Co., Springfield, Mass., skates, etc., a subsidiary of the Winchester Co., New Haven, Conn., is gradually increasing its output and by May is expected to reach its capacity of 1500 to 1800 pairs of skates per day. Its roller skate season is about to close. The manufacture of bicycles has been temporarily abandoned.

The Franklin Automobile Co., Syracuse, N. Y., manufacturer of the Franklin motor car, has requested data from the Chamber of Commerce of Youngstown, Ohio, regarding available industrial sites. The company is considering erection of an additional plant for production of a lower priced automobile.

Supt. A. L. Cromlish of the Farrell, Pa., plant of the Carnegie Steel Co., announces that orders have been received to operate eight additional open hearth furnaces. Bricklayers, structural steel workers and laborers have been called to work.

The Singer Mfg. Co., Bridgeport, Conn., is operating its plants on a five days per week basis, starting March 20. The company had a three days per week run for over a year. A fifteen per cent cut in wages also went into effect last Monday.

GERMAN SMELTING ENGINEERS

Annual Meeting Discusses Change from Bessemer to Open-Hearth Process, Exports and Armor Plate

(*Special Correspondence*)

At a recent meeting of the Society of German Smelting Works Engineers, held at Düsseldorf, the president, Dr. Vögler, in reviewing the trend of developments in the German iron and steel industry since the war, resented the charge by the Ministry of Traffic and Transportation as to the piling up of profits by the industry during the war. The injustice and inaccuracy of this charge were strikingly shown, according to Dr. Vögler, by the fact that foreign debts incurred by the industry one year after the conclusion of war were exceeding the aggregate share capital of the works.

More Open-Hearth Steel Being Made

In the course of his address, Dr. Vögler touched upon the change in iron and steel production since the war. Germany's pig iron production in 1913 amounted to 19,300,000 tons, of which total 12,900,000 tons was produced in the territories now forming the German nation. Of the 18,900,000 tons of steel produced before the war, approximately 56 per cent was basic Bessemer steel and 40 per cent open-hearth steel. The output of works located in what now constitutes German territory amounted to 15,300,000 tons, with the ratio of basic to open-hearth steel output about 47 to 48, or both processes had an almost equal share in steel production.

During the war, however, and even more so during the post-bellum period, this ratio has undergone considerable change to the detriment of the basic process whose percentage of the total output had receded to 34 per cent in 1920, with open-hearth steel comprising 60 per cent. Compared with pre-war production output of basic steel had therefore not reached 30 per cent of the 1913 figure.

Continuing, Dr. Vögler pointed to the serious aspect of the economic side of this change, for owing to the decline in basic steel production Germany was no longer a large exporter of phosphates but had become a buyer in the world's phosphate markets to the disadvantage of domestic agricultural interests.

Steel Export Movement

Turning to the export business, Dr. Vögler said that in view of the aforementioned figures, which clearly revealed the extent of decline in steel production, he could not understand all the talk about Germany flooding the world with iron and steel products. Exports amounted to about 6,500,000 tons in 1913 as compared with only 1,700,000 tons in 1920, and the best figures for 1921 were slightly above 150,000 tons per month. Exports had thus reached only 26 per cent of the pre-war figure—a fact which was giving ample food for reflection.

[NOTE.—Dr. Vögler is obviously juggling with figures, which is a comparatively easy matter in view of the elasticity of the term "iron and steel products." According to the German official statistics, exports of "iron and iron alloys and wares thereof" (which, of course, includes steel), amounted to 1,750,601 tons in 1920, while the respective figures for the period May to October are given as follows: May, 129,847 tons; June, 162,297 tons; July, 177,773 tons; August, 240,071 tons; September, 225,331 tons, and October, 246,115 tons. These figures do not include machinery, electrical supplies, and vehicles.]

German Armor Plate

Then Dr. Ehrensberger, the Krupp armor expert, read a paper on the history of armor plate production in Germany. The author gave a detailed survey of the early history of the process and the different stages of development. Production of the English compound plate, which was introduced in 1880 by the Dillingen Hüttenwerke, was taken up by Krupp's in 1890. Collaboration by the Krupp and Dillingen works resulted in the production of a soft nickel steel plate in 1892 which equalled in efficiency a wrought iron plate 16 per cent thicker. In the same year, Krupp's succeeded in turning out a plate made of half hard nickel steel whose quality was improved upon by hardening in oil and subsequent annealing.

The first gas-carburized and water-hardened armor plate was produced in 1893 and exhibited at the World's Exposition at Chicago. This nickel steel plate was substituted in 1894, however, by a nickel-chrome steel plate, the so-called Krupp plate, whose efficiency equalled that of a wrought iron plate three times the thickness and possessing an incomparable toughness. This plate, which has been introduced by all navies and is still in use to-day, is produced in the basic open-hearth furnace from nickel-chrome steel having a carbon content of 0.35 per cent, a nickel content of 4 per cent and a chrome content of 1.75 per cent.

William B. Pollock Co. Resumes

The William B. Pollock Co., important fabricating interest of Youngstown, Ohio, will commence operations April 1 on a 50 per cent basis, working off a variety of business. The company has received orders for iron and cinder ladles, boiler drums and miscellaneous equipment, in addition to a contract from the Delaware River Steel Co., Chester, Pa., to replace its blast furnace. On business now on the books, the Pollock company's capacity will be engaged at 50 per cent for fully four months, states a sales executive.

The contract with the Delaware River Steel Co. provides for replacement of its stack from the foundations up, with exception of the stoves. Fabrication will be done at the Youngstown plant of the Pollock company, and the material then shipped to the site at Chester, Pa., where it will be erected by the Pollock interest's organization. Plate stock for the furnace has been largely purchased.

When completed, the furnace will have a capacity of 350 tons. The Delaware River Steel Co. is a merchant iron interest, consuming foreign ores largely and producing foundry grades of iron for the eastern trade. A distinctive feature of the new installation will be two Mullen dry gas cleaners and washers.

Sweden's Steel Industry in 1921

The year 1921 was the worst on record in the Swedish iron and steel industry, as most of the works were idle for the greater part of the year. Of 133 blast furnaces only 22, of 201 Lancashire hearths only 37, and of 80 open-hearth furnaces only 15 were working at the end of the year, according to the London *Ironmonger*. The pig iron produced was 308,600 tons, equal to 42 per cent of the average output before the war, and the exports, which in 1913 were 502,000 tons, last year only reached 147,000 tons. The domestic consumption was insignificant, owing to foreign competition, in spite of reductions of from 35 to 50 per cent in the Swedish prices. The shipments of northern iron ore from Narvik were well maintained, but those from Lulea were practically stopped, owing to the chaos in the Upper Silesian industry. The principal takers of the Narvik ores were the German Westphalian and Rhine works, which during the great part of 1921 worked at high pressure and absorbed over 3,000,000 tons of ore.

Wilton R. Olds, George E. Ingraham and A. J. Littlejohn have purchased the interest of Charles H. Wood in the C. H. Wood Co., dealer in machinery, tools and factory supplies, Syracuse, N. Y. The three men were elected directors at a recent meeting. Mr. Olds was elected president and general manager; Mr. Littlejohn vice-president, and Mr. Ingraham secretary and treasurer. Mr. Olds has been vice-president and manager of the company for a number of years, and previous to that he was connected with the Burhans & Black Co., wholesale hardware dealer.

EUROPEAN FOUNDRY PRACTICE

New German Method to Desulphurize Cast Iron —Using Old Sand—Coke Gas Producers

Dr. Richard Moldenke was the guest at the March meeting of the New England Foundrymen's Association, held Wednesday, March 8, at the Exchange Club, Boston. The subject of his address was "Recent Developments in European Foundry Practice."

Most of the new developments, of which he talked, concerned those in Germany, and were the direct result of the war. Certain things were concealed during his inspection of various plants and processes and since then German interests have not been able to patent their processes in this country; consequently, Doctor Moldenke was frank to state he was not in a position to explain in detail some of the things he discussed.

For instance, the Germans had discovered a new process for desulphurizing cupola iron. The metal is run from the cupola into a ladle and the slag removed. The contents of a package, about the size of a cigarette box, are then thrown into the ladle, which the metal absorbs in about two and one-half minutes. The original sulphur content of the iron is reduced about one-half if the slag is removed. The contents of the package are in powdered form. Doctor Moldenke said it might be potash, or possibly potash plus some ferro-alloy. Whatever it is, it is cheap, and affords a method of securing better castings in this country by the small foundry owner who cannot afford an electric furnace, or the expense of large percentage pig iron cupola charges, the two other methods of reducing sulphur.

In Doctor Moldenke's opinion the Germans have not progressed as far as we have with the electric furnace. Great progress has been made in Germany, however, in methods of handling molding sands. By regrinding, etc., they are able to use such sands many times and, in so doing, produce finer castings than they did before the war. He also touched on a new type of gas producer used in steel mills. This producer is practically a small blast furnace, 10 ft. high and 7 ft. in diameter. These producers are charged with coke and 2-lb. air pressure is supplied by centrifugal blowers. No steam is employed. Each charge produces, besides gas and slag, a small amount of 12 per cent manganese pig iron, which, it is claimed, pays for the cost of operation of the gas producer.

About 120 members of the association attended the meeting. E. H. Ballard, president, presided. He announced a committee has been appointed to prepare a question box to be brought up at future meetings, and that electric furnaces and non-ferrous metals will be the subjects at forthcoming meetings.

Better Co-ordination of Cost and Production Methods Advocated

That in the majority of factories the relation of cost accounting to production methods is not what it should be was an opinion expressed by Horace G. Crockett, supervising industrial engineer, Scovell, Wellington & Co., New York, at a meeting of the Society of Industrial Engineers, New York chapter, held in the Engineering Societies Building, March 14.

In Mr. Crockett's talk which was on the relation of cost accounting to production methods, he pointed out that in many factories where excellent production control is maintained the cost system utterly fails to reflect conditions. In other plants elaborate cost systems have been built up on an entirely wrong foundation of production methods. "On the one hand we have an excellent production system," he said, "but the management is without any good measuring device with which to determine what it actually accomplishes for them. In the other case we have a good cost system which balances beautifully and ties in with the general books, but tells little or nothing except the net profits at the end of the month."

One of the chief causes for this discord between cost and production in many factories is a lack of understanding or appreciation on the part of the various individuals of the other man's job, Mr. Crockett said. The production engineer is inclined to think that if he follows standards of time and quantity very closely, the dollars take care of themselves. Production managers have been inclined also to look upon cost accounting as a necessary evil, to be performed by a good clerk and that the whole aim and object of a cost system is to determine the cost of the article sold.

"We have come to realize," he said, "that that is not by any means the sole function of a cost accounting system. The title cost accounting in itself is somewhat misleading, and perhaps factory accounting would be better. The value of a cost system is in direct ratio to the information that it supplies, not only about the cost of products, but the cost of every activity of importance in the factory, and provided that information is presented in the way it can be used best by the men responsible for reducing costs, decreasing expenses and maintaining efficient control."

Topical questions discussed by Mr. Crockett included: How much do your foremen know about your costs—not only costs of product, but costs of operating their departments, subdivided according to the activities they control and measured according to proper standards? He pointed out that in many plants the foreman never sees cost or expense figures, although he is the man who must see that standards are realized and results accomplished. In this connection he emphasized again the necessity of the cost accountant's giving consideration to the information that he should be supplying. "Many cost accountants seems to think that the factory is organized to supply them with certain figures, so that they can close their books at a certain time of the month," he said. "They do not realize that their most important function is the kind of information that they give back to the manufacturing executives."

Another topical question taken up was: Was your cost system built up from the factory or down from the office? It should be built up from the factory, he said.

Money or profit is the motive behind the manufacturing activity, he continued, and in the last analysis it is the figure that appears at the bottom of the profit and loss statement as the net profit from operations that tells the story. The executive controlling the business is interested in dollars and cents of profit and he is going to start investigations and enforce economies accordingly as the final net profit figure is favorable or otherwise. The production engineer must realize that while it is true that if you set proper standards of time and quantity you can measure your performance by the degree you approach those standards in time and quantity, and without the aid of dollars and cents, you must have that additional information if you are to know which particular product or operation needs attention.

L. B. Dorr, general auditor, Robt. H. Ingersoll & Brothers, New York, addressed the meeting on merchandise inventory control, explaining in detail the physical double-entry accounting operated by his company. Joseph Mayer, National Industrial Conference Board, and president of the New York chapter, presided.

The Carbon Limestone Co., Youngstown, Ohio, is now shipping flux-stone for blast furnaces in the Valleys at the rate of 35,000 tons a month. During the low point in the industrial depression, shipments had virtually ceased for a time owing to reduced blast furnace operation. In 1921 the company shipped 30,000 tons of agricultural limestone, but shipments are now at the annual rate of 50,000 tons.

F. E. Carnick and others have organized the Valley Steel Co. at Youngstown, Ohio, which will take over the business of Carnick Bros., dealers in scrap metals and iron and steel products. The old organization of Carnick Bros. remains with the new interest.

TRADE ORGANIZATIONS

Objects of Conference to Be Held April 12 with Secretary Hoover

WASHINGTON, March 21.—Representatives of national trade organizations will hold a conference in Washington on April 12 with Secretary of Commerce Hoover to discuss methods of co-operation between the Department of Commerce and associations concerning statistical information. In order to make another trip to Washington unnecessary, the National Association of Manufacturers has called a meeting to be held in Washington on April 11 of manufacturers and others interested in the subject of the production and use of industrial motion pictures as an aid to American industry. The association is co-operating with the department, with regard to both subjects and will supply him with a preliminary print of the results of its questionnaire directed to trade associations. This print will be made available to Secretary Hoover for use in connection with the meeting of April 12.

The purposes of the conference with representatives of trade associations have been announced by Secretary Hoover as follows:

Securing a list of trade associations that will furnish voluntarily to the Department of Commerce the classes of statistical information outlined in the correspondence between the Department of Commerce and the Department of Justice, published on Feb. 16.

Discussing and considering means and methods that may be best adapted for collecting and forwarding to the Secretary of Commerce, for dissemination, the classes of statistical information outlined in the correspondence referred to, including the forms of reports that will be most suitable, for associations that are willing to furnish such statistical information.

Discussion of the manner in which such reports of the statistical officer of the associations are to be filed with the Department of Commerce, and the manner and method of distributing the information to the members of the associations and to the public.

Tentative Program for Foundrymen's Convention

A tentative program for the annual convention and exhibition of the American Foundrymen's Association in Rochester, N. Y., June 5 to 9, is announced as follows:

Monday, June 5

Morning: Opening of exhibits.

Afternoon: Joint general session of A. F. A. and Institute of Metals Division, A. I. M. E. Address of welcome, response, etc.

Tuesday, June 6

Morning: Gray iron session.

Afternoon: Steel and non-ferrous sessions.

Wednesday, June 7

Morning: Steel and non-ferrous sessions.

Afternoon: Industrial relations session.

Evening: Annual banquet.

Thursday, June 8

Morning: General session, molding sand symposium.

Afternoon: Special entertainment features.

Friday, June 9

Morning: Malleable session; final business session; 5 P.M., close of exhibits.

Committee Chairmen of American Foundrymen

The chairmen of the important committees of the American Foundrymen's Association are announced as follows:

Papers: Robert E. Kennedy, 909 West California Street, Urbana, Ill.

Convention and Exhibits: W. R. Bean, Eastern Malleable Iron Co., Naugatuck, Conn.

Awards: G. H. Clamer, Ajax Metal Co., Philadelphia.

Promotion and Membership: Alfred E. Howell, Somerville Stove Works, Somerville, N. J.

Nominating: Benjamin D. Fuller, Defiance Paper Co., Niagara Falls, N. Y.

Foundry Costs: J. Roy Tanner, Pittsburgh Valve, Foundry & Construction Co., Pittsburgh.

Safety and Sanitation: Benjamin D. Fuller, Defiance Paper Co., Niagara Falls, N. Y.

Industrial Education and Training of Apprentices: C. B. Connelley, Department of Labor and Industry, Harrisburg, Pa.

Steel Foundry Standards: W. A. Janssen, American Steel Foundries, Chicago.

Standard Pattern Practice: Vaughan Reid, City Pattern Works, Detroit.

Advisory to U. S. Bureau of Standards: Richard Moldenke, Watchung, N. J.

April Meetings of Steel Electrical Engineers

Scheduled meetings in April for the Association of Iron and Steel Electrical Engineers include the following:

April 10, Cleveland, topic: "General Use and Abuse of Flexible Steel Ropes in Steel Mills."

April 15, Pittsburgh, topic: "Selective Switching, Including Overload and Reverse Relays and the Interconnecting of Large Power Plants."

April 18, Philadelphia, topic: "Wireless Telegraphy, Telephony and Radio Control."

April 22, Pittsburgh, topic: "Heating Furnaces."

Some time during the month an inspection trip will be made to Wheeling, W. Va.

COMING MEETINGS

April

National Federation of Construction Industries. April 3, 4 and 5. National conference, Drake Hotel, Chicago. Association headquarters, Drexel Building, Philadelphia.

National Metal Trades Association. April 19 and 20. Annual meeting, Hotel Astor, New York. Secretary, Louis W. Fischer, Peoples Gas Building, Chicago.

American Gear Manufacturers' Association. April 20, 21 and 22. Annual meeting, Hotel Lafayette, Buffalo. Secretary, F. D. Hamlin, 4401 Germantown Avenue, Philadelphia.

American Supply and Machinery Manufacturers' Association and **Southern Supply & Machinery Dealers' Association.** Joint Meeting. April 24 to 26, Birmingham. F. D. Mitchell, 233 Broadway, New York, is secretary of the American association and A. M. Smith, Smith-Courtney Co., Richmond, Va., is secretary of the Southern association.

National Machine Tool Builders' Association. April 25 and 26. Spring convention, Hotel Traymore, Atlantic City, N. J. General manager, E. F. DuBrul, 817 Provident Bank Building, Cincinnati.

Society of Industrial Engineers. April 26 to 28. Spring meeting, Hotel Statler, Detroit. George C. Dent, business manager, 327 S. La Salle Street, Chicago.

American Electrochemical Society. April 27 to 29. Spring meeting, Baltimore. Acting secretary, Dr. Colin G. Fink, 110 Park Avenue, New York.

May

Iron and Steel Institute. May 4 and 5. Annual Meeting. Quarters of Institution of Civil Engineers, London, England. Secretary, George C. Lloyd, 28 Victoria Street, S. W., London.

The National Supply and Machinery Dealers' Association. May 8, 9 and 10. Seventeenth annual convention, Marlborough-Blenheim Hotel, Atlantic City. Secretary, T. James Fernley, 505 Arch Street, Philadelphia.

American Society of Mechanical Engineers. May 8 to 10. Spring meeting, Atlanta, Ga. Secretary, Calvin W. Rice, 29 West Thirty-ninth Street, New York.

National Association of Manufacturers. May 8, 9 and 10. Annual Convention, Waldorf-Astoria Hotel, New York. General offices, 50 Church Street, New York.

National Foreign Trade Council. May 10 to 12. Convention Hall, Philadelphia. Secretary, O. K. Davis, 1 Hanover Square, New York.

National Sheet Metal Contractors' Association. May 15 to 19. Convention and exposition, Cadle Tabernacle, Indianapolis.

National Association of Purchasing Agents. May 15 to 20. Annual convention and exposition. Exposition Park, Rochester, N. Y. Secretary, H. R. Heydon, 19 Park Place, New York.

American Iron, Steel & Heavy Hardware Association. May 23 to 25. Annual meeting, Hotel Washington, Washington. Secretary, A. H. Chamberlain, Marbridge Building, New York.

American Society for Steel Treating. May 25 and 26. Sectional meeting, Pittsburgh. Secretary, W. H. Eisenman, 4600 Prospect Avenue, Cleveland.

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ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY WILLIAM W. MACON GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

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The Lack of Invention

In the readjustment that has already been under way for a year and a half we are being faced with a number of unpleasant truths. The surpluses built up in years of apparently large profits are found to be partly fictitious. We cannot receive individually more of this world's goods in proportion to the service we render; in other words, the war did not automatically furnish us a higher standard of living. We cannot sell goods to nations that are unable in their turn to sell. There are various other unpleasant truths.

Some of these truths that are almost staring us out of countenance are closely associated with illusions that sprang up during the war. As to the "higher standard of living," for illustration. Before the war, no one would have been considered safely at large if he had proposed: "Let us have a great war, killing many people, and destroying a great deal of property, and wasting much time. Then each of us will be able to get more goods for the amount of work we do." Yet during the war just such a belief took shape. The unpleasant truth facing many people now is that this was an illusion.

Likewise during the war there sprang up a belief that after the war there would be a great period of construction throughout the world, and that this construction work would make everybody prosperous. That was an illusion. One misconception that fostered it was that prosperity results from construction, the truth being that construction results from prosperity. The prosperity is due to what may be called in a broad sense "savings." Using the words in the most general way, we save and invest the savings. In a narrow sense, a man saves money and then invests the money, but in the broadest sense a people can save, in money, in materials and in time and effort, and use the surplus created in the production of permanent facilities or wealth.

One of the ways in which mankind has saved in the past has been by invention. The cotton gin, the harvester, the sewing machine, the linotype, innumerable inventions, all resulted in the saving of time, and the time saved has been used in various ways; thus we have become better off, we have progressed or prospered.

Added to the unpleasant truths already generally recognized that we must now face is the fact that the past eight years have been particularly bare of inventions enabling us to save. There has been some progress, but not much. Three great new things that we have are the automobile, the cinema and the wireless. Each has effected a saving, but very little compared with the time and energy we spend on them. Each represents in a large degree a luxury or pastime. They do not help us to do things more expeditiously or more easily to an extent that enables us as a nation to save.

A good point about new inventions is that they effect so promptly an improvement in business. It is not necessary to wait until the savings they promise have accumulated, for business to improve. As soon as the merit of a new idea is recognized capital is invited, facilities for employing the invention are created and materials are bought. Relief is afforded from the condition of some industries being overbuilt. As a rule in all the past some things have been overbuilt while others have been underbuilt. There are overbuilt industries now, but with the usual supply of new inventions we should have also underbuilt industries, and thus the situation would be relieved. What we must and will do is to invent, bring out new things that will make a market for themselves.

While the value of iron and steel shares is not always an indication of business conditions at the time, the trend in securities is often significant. A compilation made in Great Britain shows that in the case of six iron and coal companies, nine iron, steel and engineering companies and 24 iron and steel companies, the average of market values of the 39 stocks at the peak on March 31, 1920, was 163.9 per cent of the par value. After that date the decline was steady, with one exception, until on Feb. 14, 1922, the market average was 79. In the case of the 24 iron and steel companies, the peak was 148 on March 31, 1920, and the low point on Feb. 14, this year, was 73.8. At the really critical period in the British steel industry, in the second quarter of last year, when operations had virtually ceased because of the coal strike, the percentage figure was 89.6 on June 30, 1921. Despite a marked revival in the industry up to the present time, par-

ticularly with January exports exceeding those of any other country, the stock market index is at the lowest point in over two years.

World Movement in Steel

Some striking changes are shown by an analysis of the iron and steel export statistics of the leading producing nations for 1921, which recently have been made complete. The figures for last year, compared with those for 1913 and 1920, are as follows in thousands of gross tons:

	1913	1920	1921
United Kingdom	4,969	3,251	1,700
United States	2,892	4,706	2,180
France	578	895	1,525
Belgium	1,546	892	904
Germany	*6,203	1,723	†1,607
Total	16,188	11,467	7,916

*Luxemburg included. †Eight months, May to December.

The first fact that stands out is that in 1921 the total movement of 7,916,000 tons was about 70 per cent of the exports in 1920, despite the world-wide depression. Compared with the iron and steel production in the same countries the difference is marked, because the 1921 pig iron and steel output was only 53 per cent and the steel output 56 per cent of the 1920 figures. The conclusion is that a liquidation in stocks took place last year which was world wide.

A second striking feature of these data is the pronounced rôle of France. Not only did that country exceed in 1921 its sales in 1920 but they easily surpassed the pre-war record in 1913 by nearly threefold. France is also the only country whose exports last year not only suffered no diminution as the year progressed but also exceeded the pre-war record. With the acquisition of German capacity, France has been compelled to find new outlets in foreign trade.

One important development is not shown in the above table, and that is that at the close of the year Germany was leading all other countries in iron and steel exports, with Great Britain, France, the United States and Belgium following in the order named—a marked reversal of the position obtaining early in the year.

The volume of international trade in steel last year was less than 49 per cent of what it was in the year before the war, and it is likely to be some years before these countries will equal or exceed combined exports of over 16,000,000 tons. Even in the boom of 1920, the total was far from reaching 1913 proportions. When world demand again approaches the pre-war scale the old alinement need not be expected, but whether the United States can improve on third position will depend on the right settlement of some questions of national policy in which the outcome is none too clear at this writing.

As was to be expected, the personnel of a Washington local organization aiming at establishing the metric system in this country is largely, if not wholly, made up of those who have no real stake in the change. The translator who has to convert metric units into those of the English system would like, of course, to be relieved of the job, but he has no machinery, jigs, fixtures or equipment to scrap. Pro-metric advocates try periodically to gain the limelight but they find it hard to arouse sustained interest outside of industrial circles; and it is in the outside fields that they must get adherents, those who do not know the other side of the question. So long as these missionaries for the metric system remain with us, so long will it be necessary to maintain educational bureaus to controvert the plausible arguments addressed to the man who can sign his name to a petition with entire immunity from the heavy loss a metric law would visit upon industry.

Liquidation of Metal Prices

Since the peak was reached in April, 1920, the prices of metals and metal products, reported monthly by the Bureau of Labor Statistics, have fallen steadily, with three insignificant interruptions, from an index of 195 to 115. In other words, while these prices were 95 per cent above the 1913 average, two years ago, they are now only 15 per cent above that average and are, incidentally, much nearer to the 1913 figures than any other of the nine groups reported upon by the bureau. Only in July and August of 1920 and in October of 1921 was an advance recorded in this group above the previous month, these advances being respectively 1, 2 and 1 points.

No other group in the entire list can show in the same measure the steady decrease in price recorded by the metals group. All of the others have had their marked ups as well as downs, and the only ones which have been comparable with metals in their ratio of liquidation have shown substantial increases over low points reached last June. Thus, farm products stand now at 126 as compared with 116 in January and 113 last June; and food products stand now at 138, as compared with 134 in January and 132 last June.

Much has been said, in Congress and out, of the plight of the farmer. His prices, after being considerably higher than those of metals, fell in October, 1920, for the first time below the metal figures. They kept consistently below the metal figures until last September, subsequently having been both above and below, due to fluctuations month by month. They are now 11 points higher than metals, while last June they were 19 points under metals. This shows a 30-point change between metals and farm products, the metals taking the lower prices.

In liquidation of prices from the 1920 peak, metals have lost 84.2 per cent of the excess of that peak over the 1913 average. Farm products, figured in a similar manner, have liquidated 82.2 per cent; food, 79.7 per cent. All commodities averaged show a liquidation of 70.4 per cent, but none of the separate groups, except the three mentioned, shows so much liquidation as 70 per cent.

It will be evident that the drop in metal prices has been brought about largely by the steady drop in pig iron and finished steel, as indicated week by week by THE IRON AGE composites, and partly by the drop in copper and other non-ferrous metals, which began long before steel started to drop, and in which prices have lately shown signs of stiffening. Steel and iron of course are the

dominant factors in the metal and metal products groups, hence the steady down grade of the index for that group is a reflection, largely, of the status of the iron and steel market.

The Bituminous Coal Strike

The small chance there may have been of the walkout at the bituminous coal mines being averted seems to have disappeared when representatives of District No. 5, United Mine Workers, failed to accept the proposal of the operators of the Pittsburgh district that a wage agreement conference be held last Monday. The United Mine Workers remains firm in its stand that it will not negotiate anything with the operators except a national agreement, while the operators are equally firm that they will enter into no negotiations looking toward a national agreement. In most districts, if not all, the operators are willing to negotiate with the men in their respective districts.

The desire of the United Mine Workers for a national agreement is a natural one, but as wage agreements are usually made a national agreement means a national scale. That is the case, for instance, with the scales of the Amalgamated Association, which prescribe wages for a sheet mill, tin mill or iron mill irrespective of its location. With carpenters, printers, and other workers having national organizations, scale agreements are made by local and not national conferences. The practice in determining bituminous coal wage scales has been unique, in that agreements have been reached between the United Mine Workers and a certain group of operators, viz., those in the so-called "central competitive field," Pennsylvania, Ohio, Indiana and Illinois. Scales for other districts were derived from this basic scale, the operators concerned having had no voice in determining the basic scale.

While the breaking up of the central competitive field, through the operators of Ohio and Pennsylvania last December refusing to continue the arrangement, has appeared to be the chief cause of the failure of the usual system to operate, the fact is that the operators of other districts are strongly opposed to the system. Some of them have expressed to Secretary of Labor Davis their opinion of the system in vigorous language.

The failure of the machinery to produce a conference is, however, really only an incident. If the four-State conference had been held, there would have been a disagreement. If scale rates could have been agreed upon, which is very doubtful, the parties certainly would have split on the check-off. The operators are absolutely opposed to continuance of the check-off, while the officials of the United Mine Workers cannot see a prosperous future for themselves without it.

The miners cannot view the check-off in exactly the same spirit as their officials, since the money involved in the check-off is money that the miners pay, while it is money the officials receive. Naturally that makes a difference.

The prospective suspension is different from many that have preceded it, in that the objective is plainly a reduction in the cost of coal to the consumer. In not a few suspensions in the past the outcome was an advance in the market price of coal, whereby the operators became willing to grant the miners higher rates than seemed feasible before April 1.

The weekly reports of coal production indicate that the country is well stocked, for the increase in production since the beginning of the year has been much greater than would be accounted for by any conceivable increase in consumption. Production has risen to 11,058,000 tons in the week ended March 11, against an average in the closing weeks of the old year of scarcely more than 7,000,000 tons a week, when domestic requirements were heavier than of late. Rarely if ever has a prospective mining suspension been so well advertised long in advance. Separate evidence of the large stocks held by consumers is seen in the softening of coal prices within the past two or three weeks.

Demand from Japan was an important factor in American iron and steel exports during the war. The movement continued in 1919 and 1920 when the monthly averages of exports to Japan were 56,900 and 56,400 tons. Following the Japanese financial crash there was a marked falling off to only 25,600 tons per month in the first half of 1921, with an average for the last half of 31,500 tons per month. November and December last year showed a recovery to nearly the rate of 1920, exports in the two months being 52,900 tons and 56,400 tons respectively. In fact, apart from these shipments to Japan our total iron and steel exports in those months would have been only 70,000 tons and 73,600 tons, or on a parity with those of Belgium, which in 1921 were 75,300 tons per month.

CORRESPONDENCE

Mexican Trade Going to Europe

To the Editor: It is deplorable the way American manufacturers and exporters are letting Europe get away with Mexican business. It is quite true that some American firms are getting business from the Tampico-Tuxpam oil fields and also some business from mines. But the bulk of the machinery, hardware and iron and steel trade is now going to Europe. It is going to take a long time for Americans to get these customers back, if ever, and if any effort is going to be made toward this end, it will have to be put forth now without waiting on recognition.

I recently made a hurried business trip into northern Mexico and I found importers of German, English, Spanish and French goods of all kinds taking advantage of the situation, and while they work they are praying that our Government will continue to delay indefinitely extending recognition to the present Mexican Government.

The average representative of American manufacturers who visits Mexico gets his information mostly at foreign club sessions and directly from parties interested in keeping a status quo as far as America and Mexico are concerned. Unfortunately, these representatives do not always speak the language of the country and thus are handicapped further in their investigations. Another unfortunate feature is that some representatives of our own Government make reports that are quite as undiscriminating.

The bugaboo of long-time credits necessary to do business in Mexico is constantly held up before the American exporter. Few manufacturers and exporters, except those who have trusted representatives on the ground, realize that this much advertised handicap is being overcome by European firms whose bank bal-

ances (especially since the war) do not seem to justify extending long credits.

The ordinary way by which European companies overcome this handicap is to add enough to the price so that an attractive discount can be given on any paper accepted by the seller. Contrary to the usual belief, the money stringency in most parts of Mexico is no worse now than it is in the United States, and many times a Mexican firm will discount its own paper. Then, too, the banks in different localities do not hesitate to discount paper of merchants and others having good standing, especially at the attractive rates offered.

While the average American is in the dumps about losing European trade, he is overlooking a market right at his door, and is letting his foreign competitor get firmly established in a market that rightfully belongs to the United States.

This is not an argument for recognition of Mexico, but is simply a statement of facts. If American business sits back and waits for formal recognition much longer, trade with Mexico will dwindle to a point that will include only those things that cannot be purchased in Europe. Our exports to Mexico, even during the ten years' revolution, have run large figures, as consular reports will show. Shall we sit down and calmly look on, without an effort to save what business we have down there? CHARLES L. SMITH.

El Paso, Tex., March 15, 1922.

IMPROVEMENT IN PICKLING

New Compound Developed to Retard Acid Attack on Sound Metal

BY GEORGE W. EMLEN, JR.*

ONE department of almost every steel plant that everyone avoids like the plague is the pickling house. Clouds of evil-smelling steam and poisonous gases make it an excellent place to stay away from. This probably accounts for the fact that there is less scientific knowledge of pickling problems than of those of other important departments of the steel industry. It is curious to contemplate that, in some of the most carefully supervised steel mills in this country, the pickling process is left more or less to haphazard and its operation often entrusted to the care of ignorant men, in a way that would be considered extremely slipshod in any other of the major operations.

This condition leads to more than one grave result. In the first place, the fact that workmen may be forced to breathe in an atmosphere that is heavy with acid-laden steam needs no comment. The presence of these acid fumes and steam works untold damage to hoists, cranes and other incidental metal work necessary to the pickling operation.

Economy in the use of acid is another feature that would seem to be strangely overlooked. It is a well-accepted theory in many steel plants that high temperatures speed up the pickling operation, but it is an absolute fact that the steam caused by such temperatures carries with it a considerable volume of free acid which not only does damage to surrounding objects, but is carried off and lost. Moreover, there are methods of greatly prolonging the potency of the pickling bath which we shall take up later. Too often the strength of the bath is guessed at after a considerable amount of metal has gone through, with the result that it frequently is considered exhausted when there may be a large proportion of effective acid still available. Sometimes the pickler judges of the bath's condition by feel, taste or appearance, any one of which may be misleading.

Acid Attack on Metal

Another troublesome but little understood condition is acid attack on the sound metal. The object of pickling, as we all know, is to remove oxide scale. This removal is brought about by acid attack on the metal itself and the evolution of hydrogen gas, brought about by acid-metal contact, causes the scale to flake off. Unfortunately, as the layer of scale is seldom evenly distributed on the steel, it follows that good, clean metal is subject to acid attack, while an adjacent portion is being cleaned. Blisters, brittleness, stains, after-sweating and other evils are the result of prolonged acid attack on metal, not to mention an actual loss of weight of the steel itself, which will run to impressive figures after many thousand tons have been pickled.

English and German steel makers have stolen a march on us when it comes to pickling. An organic compound known as "pickelette" has been invented which, when added in minute proportions to the acid, seems to have the effect of practically eliminating the evolution of hydrogen in the pickling bath. It follows that the acid breaks up with far less rapidity than usual, with the result that about 50 per cent more metal can be cleaned in a given bath. It seems that acid so treated with pickelette removes the scale without attacking the underlying steel to anything like the usual degree. Hence there is a uniformly better surface on the steel after pickling; blisters, brittleness, after-sweating, etc., are done away with and there are practically no bad fumes given off from the bath.

*Manager Pickelette Dept., Matthew Addy Co., Philadelphia.

Working Method

Naturally, no one need suppose that a small dose of pickelette will immediately end all his pickling troubles. Like anything else, it has to be handled with intelligence and by following definite rules. The quality of the steel pickled has a good deal to do with the results obtained. In general, however, the following directions apply: It must be added to the raw acid before dilution in the proportion of 0.10 to 0.15 per cent —say about 3 lb. per ton of acid. The temperature of the bath must be kept at about 140 deg. Fahr. Pickelette breaks up under higher temperatures, and slows up the action of the bath if a much lower temperature be employed. A fairly strong solution of acid with water is preferred and, where higher temperatures have been the practice, a stronger solution will compensate for any loss of speed caused by lowering the temperature, and the presence of pickelette will still effect an economy.

Exhaustive experiments carried out by J. E. Stead, D.Sc., D.Met., F.R.S., etc., have proved the foregoing statements; and the wide use of pickelette in England and on the Continent is a further indorsement of its success.

The figures given above are based on the use of 60-deg. Baumé sulphuric or 17-deg. hydrochloric acid, but pickelette may, of course, be adapted to different acid strengths. In fact, the whole subject of pickling is one which deserves considerably more study than has been generally given to it, and if such research be accompanied by an intelligent investigation of the new compound, there should certainly be important advances made in our knowledge of the subject. Specific reports on the application of pickelette should be available before long, as the compound has now been introduced into a number of steel mills in this country.

German Ferroalloy Prices Advance Sharply

The renewed weakness in the mark exchange has had a striking influence on values of ferroalloys in Germany, says the *Metal Bulletin*, London, March 10. The market had been quiet for some time, but the rise in foreign exchanges has brought in a brisk—and at times almost panicky—demand for all descriptions. Ferrosilicon, 45 per cent, has risen to 11,000m. per 1000 kilos, while 75 per cent registered a rapid advance to 20,000m. and over; buyers at about 24,000m. now appear to be unsuccessful in obtaining material. Meanwhile, 90 per cent alloy is not offered freely, not so much because a shortage exists, as in expectation of higher prices; the present value is nominal at 30,000m. Ferrochrome, which had been weak, has undergone a revival, present quotations being: Maximum 1 per cent carbon, 105m.; 2 per cent, 90m.; 2 to 4 per cent, 76m., and 4 to 6 per cent, 60m. per kilo.

MACHINERY CONSOLIDATION

Seven Machine Tool Companies and Other Interests Included in Merger Plans

A merger of a number of machine tool manufacturing companies, which has been under negotiation for some months, is likely to be consummated in the near future. Announcement may be made in the coming week of the completion of the new organization, as it is understood that only matters of detail remain to be arranged. Seven companies whose names have been commonly mentioned in connection with the consolidation are the Betts Machine Co., Rochester, N. Y.; the Colburn Machine Tool Co., Cleveland; the Newton Machine Tool Works, Philadelphia; the Modern Grinder Mfg. Co., Erie, Pa.; the Carlton Machine Tool Co., Cincinnati; the Lodge & Shipley Machine Tool Co., Cincinnati, and the Hilles & Jones Co., Wilmington, Del.

Though manufacturing a fairly complete line of machine tools for all purposes, the new company will be particularly strong in shop equipment for railroads.

The capitalization generally named in connection with the plans of the syndicate points to the inclusion in the new corporation of important companies outside of the seven named above.

Efforts to Prevent Coal Strike Not Exhausted

WASHINGTON, March 21.—Announcement was made this afternoon at the White House that the Government has not entirely ceased its efforts to prevent a strike of union bituminous coal miners on April 1. It is evident, however, that the Administration has only slight hope of bringing about a conference between operators and miners and of forestalling the strike. The little hope there was became even less with receipt of the report from New York that Philip Murray, international vice-president of the United Mine Workers of America, said the order for suspension of work in both the anthracite and bituminous union mines throughout the country would be issued later in the day. Federal court indictments which charged operators and union miners with conspiring to fix coal prices and damage non-union coal mines are held by operators as the reason for refusal to meet the miners.

President Lewis of the Mine Workers announced here yesterday that the policy to be followed by the bituminous miners when work is suspended on April 1 will be formulated at a conference to be held in Cleveland on Friday of the present week. The conference will be attended by 116 men who are members of the general policy committee of the miners' union, it was stated, and who will have full authority to conduct the affairs of the union during the strike.

Error Claimed by Attorneys for Federal Trade Commission

WASHINGTON, March 21.—Assignments of error constituting the basis of appeal in the Claire Furnace Co. cost reporting case were filed yesterday with the Supreme Court of the District of Columbia by Attorneys William T. Chantland and Jesse C. Adkins of the Federal Trade Commission. Efforts will be made to have briefs prepared at an early date in order to present the case before the Court of Appeals and possibly a decision before summer vacation begins.

Boston Molders' Strike

As a result of the failure of union molders and foundry owners of greater Boston to come to an agreement on a new wage schedule, the employees of eight or nine Greater Boston foundries failed to report for work on March 15 and, since then have remained out. The total number of men out on strike is approximately 175.

FAR EAST STILL ACTIVE

Rails and Bars Pending—South America Buys—Caucasian Manganese Ore Imported

NEW YORK, March 21.—The upward trend of Japanese buying continues strong, although it is still largely confined to government and private purchasing of rails, private buying of mild steel bars and some small black sheet business. With the approach of spring activity, there is a slight increase in inquiries for light gage black sheets, which, it is generally believed, will later approach a considerable volume. Government purchases for the railroads exhibit no tendency to decrease at present, but the recent stiffening of prices quoted on export rails will probably exert a deterrent effect upon continued placing of heavy tonnages with American mills. About 2000 tons of bridge material was recently placed by the Imperial Government through a large Japanese export house and there is another government tender, which closed March 20, in Tokio, calling for a small tonnage of mild steel square bars for making railroad spikes.

Among the railroad inquiries either pending or not yet reported awarded are 21 miles of 60-lb. rails for the Kongosa electric railroad, to be shipped c.i.f. Corea, and about 3000 tons of 75-lb. rails for the Tokaido Tetsudo K. K. Recent bar purchases have been small in proportion to the large number of inquiries of size that are in the market. One Japanese house has closed two orders, one of 555 tons, the other of 435 tons for ⅜, ¼, ⅝ and 1-in. steel bars and also about 800 tons of light gage black sheets.

There has been an active interest on the Pacific coast, particularly among lumber interests, in the purchase of Belgian and French rails. While a few have been bought, a number of the inquiries figured on during the past few months have not developed into orders. The recent report of a 25,000 ton purchase of Belgian rails by railroad interests on the Pacific coast can not be confirmed. A recent quotation, made on 60-lb. rails of Belgian origin, was $40, c.i.f. San Francisco.

South American markets are improving, some activity being noted in black and galvanized sheets and No. 14 to No. 20 gage plain wire for redrawing cold. The present trade is largely confined to Argentine purchasers, although some business is reported from Rio de Janeiro, Brazil.

Increasing imports of manganese ores are indicated. One New York importer recently closed with an eastern furnace for 50,000 tons of 52 per cent manganese ore from the Caucasus to be shipped from Poti, Georgia. While the present market price of this ore delivered Atlantic port is probably not less than 25c. per unit, this contract is understood to have been made at 24½c. per unit. Only recently have shipments of this ore been possible and for some time it has been quoted above Brazilian manganese ore.

To Manufacture Doxford Diesel Engines at Chester

Arrangements have been made for the manufacture in this country of internal combustion engines of the opposed piston type. William Doxford & Sons, Ltd., Sunderland, England, have arranged with the Sun Shipbuilding Co., Chester, Pa., for uniting the interests of the American Junkers patents with the Doxford patents, which have been the basis of the developments forming the Doxford opposed piston two cycle engine, built by the British firm.

The Sun Shipbuilding Co, has secured the license for America and its possessions of the Junkers patents. An immediate start is to be made at the Chester works on the construction of a four-cylinder, 3000-h.p. single screw installation, being a duplicate of the Doxford manufacture, two of which engines are already at sea in the motor ships Yngaren and Dominion Miller.

The Standard Steel & Bearings, Inc., Plainville, Conn., has increased its working forces slightly because of better business.

Lowest Rate in Corporation's History

Average for Year 1921 Was 47.5 Per Cent of Capacity, as Shown by Annual Report—Heavy Cost of Transportation an Important Factor in Causing Deficit

THE twentieth annual report of the United States Steel Corporation for the year ended Dec. 31, 1921 is notable for the brevity of the comments of Chairman Gary upon the remarkable reversal of conditions in 1921 as compared with 1920. His general remarks were as follows:

"The marked decrease in the demand for iron and steel products which developed in the midsummer of 1920, continued until the early fall of 1921, when there was some improvement. As stated in the annual report for last year, the subsidiary companies carried forward into 1921 a substantial tonnage of orders for steel products. This enabled them to operate at an average of somewhat over 70 per cent of capacity during the first quarter. The degree of operations dropped in succeeding months and reached the low point for the year in July, when the output was only about 29 per cent. The average production for the entire year in rolled and other finished products for sale was 47.5 per cent of capacity, the lowest ratio of production to capacity in any year since the organization of the Corporation. Concurrently with the decrease in demand for steel products there were marked declines in the prices obtained for nearly all classes of the same. These price reductions as a rule exceeded the decreases it was possible to effect in the cost of production through the reduction in unit prices of factors entering into cost of operations and the exercise of rigid economies. A number of elements in the cost of producing steel show little, if any, recession from wartime figures, notably that of railroad transportation, which on basis of existing rate conditions averages in the case of the subsidiary companies upwards of 40 per cent of the total cost of producing steel. At the close of the year the prices prevailing for some products were below the cost of production. Since the beginning of 1922, and to the date of writing this report, the new orders received have been equal to about one-half the total capacity of the plants of the subsidiary companies."

Comparative Income Account

For the Fiscal Years Ending Dec. 31, 1921 and 1920.

	1921	1920	+ Increase — Decrease
Earnings—Before charging interest on bonds and mortgages of subsidiary companies:			
First quarter	$24,342,006.44	$44,212,019.49	— $9,870,013.05
Second quarter	23,911,921.99	45,268,551.34	— 21,356,629.35
Third quarter	20,916,498.75	50,145,301.18	— 29,228,802.43
Fourth quarter	21,620,852.32	45,469,487.27	— 23,848,634.95
Total for year	*$100,791,279.50	*$185,095,359.28	—$84,304,079.78
Less, interest on outstanding bonds and mortgages of the subsidiary companies	8,065,221.58	8,408,460.87	— 343,239.29
Balance of earnings	$92,726,057.92	$176,686,898.41	—$83,960,840.49
Less, charges and allowances for depletion and depreciation applied as follows, viz.:			
To depreciation and replacement funds and sinking funds on bonds of subsidiary companies	27,905,045.44	38,245,601.92	— 10,340,556.48
To sinking funds on U. S. Steel Corporation bonds	8,863,180.35	8,438,762.40	+ 424,417.95
Net income in the year	$55,957,832.13	$130,002,534.09	—$74,044,701.96
Deduct:			
Interest on U. S. Steel Corporation bonds outstanding	19,679,582.49	20,105,559.58	— 425,977.09
Premium paid on bonds redeemed, viz.:			
On subsidiary companies' bonds	27,835.57	118,104.19	— 90,268.62
On U. S. Steel Corporation bonds	719,626.39	717,228.49	+ 2,397.90
Balance	$35,530,787.68	$109,061,641.83	—$73,530,854.15
Add: Net balance of sundry charges and credits, including adjustments of various accounts	1,086,229.51	632,585.81	+ 453,643.70
	$36,617,017.19	$109,694,227.64	—$73,077,210.45
Dividends on U. S. Steel Corporation stocks, viz.:			
Preferred, 7 per cent	25,219,677.00	25,219,677.00	.....
Common, 5 per cent	25,415,125.00	25,415,125.00	.....
Surplus net income	†$14,017,784.81	$59,059,425.64	—$73,077,210.45
Less, appropriated from surplus net income on account of expenditures made on authorized appropriations for additional property and construction	.....	30,000,000.00	— 30,000,000.00
Balance	†$14,017,784.81	$29,059,425.64	—$43,077,210.45

*Balance of earnings after making allowances for estimated amount of Federal income and excess profits taxes.
†Deficit provided from undivided surplus.

Volume of Business

The volume of business done by all companies during the year, as represented by their combined gross sales and earnings, equaled the sum of $986,749,719, as compared with a total of $1,755,477,025 in the preceding year.

This amount represents the gross value of the commercial transactions conducted by the several subsidiary companies, and includes sales made between the subsidiary companies and the gross receipts of the transportation companies for services rendered both to subsidiary companies and to the public.

The earnings for the year resulting from the above gross business represent the combined profits accruing

to the several corporate interests on the respective sales and services rendered, each of which is in itself a complete commercial transaction.

Capital Expenditures

The expenditures made by the Corporation and the subsidiary companies during the year for the acquisition of additional property, new plants, extensions and improvements, including net stripping and development expense at mines, equalled the net sum of $70,091,866, classified generally as follows:

For manufacturing properties	$36,868,523
For coal and coke properties	9,077,692
For ore properties, including net additional expenditures for mine stripping and development	7,881,414
For railroads and lake docks	3,938,353
For ocean steamers, built by our own subsidiaries	8,216,091
For housing facilities for employees, including improvements of town sites and establishing necessary public utilities in connection therewith, less credits for sales of houses to employees	3,262,276
For purchase of additional interests in limestone properties and development of same	2,276,856
For sundry properties, including natural gas lines, development of gas properties, extension of water supply systems, etc.	447,443
	$71,978,448
Less: Credit for write-off to depreciation and replacement reserves of the original cost of improvements and equipment dismantled, etc.	1,886,582
Balance of expenditure in the year	$70,091,866

Production for Two Years

Products	1921 Tons	1920 Tons	Decrease Tons	Decrease Per Cent
Iron ore mined				
In the Lake Superior region				
Mesabi and Vermilion ranges	12,065,390	20,875,695	8,810,305	42.2
Gogebic, Menominee and Marquette ranges	2,415,802	3,587,937	1,172,135	32.7
In the Southern region				
Tennessee Coal, Iron & R. R. Co.'s mines	1,941,490	2,557,377	615,887	24.1
Total	16,422,682	27,021,009	10,598,327	39.2
Limestone quarried	4,607,486	5,981,022	1,373,536	23.0
Coal mined				
For use in the manufacture of coke	14,546,103	24,384,925	9,838,822	40.3
For steam, gas and all other purposes	7,081,836	6,443,409	638,427*	9.9*
Total	21,627,939	30,828,334	9,200,395	29.8
Coke manufactured				
In bee-hive ovens	1,698,178	6,125,032	4,426,854	72.3
In by-product ovens	8,127,086	10,083,079	1,955,993	19.4
Total	9,825,264	16,208,111	6,382,847	39.4
Blast furnace production				
Pig iron	8,547,199	14,352,617	5,805,418	40.4
Spiegel, ferromanganese and ferrosilicon	131,063	180,029	48,966	27.2
Total	8,678,262	14,532,646	5,854,384	40.3
Steel ingot production				
Bessemer ingots	2,950,897	5,402,897	2,452,000	45.4
Open-hearth ingots	8,015,450	13,875,063	5,859,613	42.2
Total	10,966,347	19,277,960	8,311,613	43.1
Rolled and other finished steel products for sale				
Steel rails (heavy and light tee and girder)	1,480,049	1,490,616	10,567	.7
Blooms, billets, slabs, sheet and tinplate bars	409,767	1,023,762	613,995	60.0
Plates	723,355	1,759,263	1,035,908	58.9
Heavy structural shapes	439,762	1,040,619	600,857	57.7
Merchant bars, hoops, skelp, light shapes, etc.	1,125,961	2,846,686	1,720,725	60.4
Tubing and pipe	984,285	1,429,691	445,406	31.2
Wire rods	88,232	254,968	166,736	65.4
Wire and wire products	915,651	1,757,141	841,490	47.9
Sheets (black and galvanized) and tinplates	1,024,542	1,610,531	585,989	36.4
Finished structural work	272,621	416,469	143,848	34.5
Angle splice bars and all other rail joints	198,397	235,913	37,516	15.9
Spikes, bolts, nuts and rivets	60,291	93,464	33,173	35.5
Axles	22,567	97,145	74,578	76.8
Steel car wheels	35,101	73,819	38,718	52.4
Sundry steel and iron products	79,753	98,415	18,662	19.0
Total	7,860,334	14,228,502	6,368,168	44.8
Miscellaneous products				
Zinc	33,426	63,077	29,651	47.0
Sulphate of iron	24,499	40,291	15,792	39.2
Fertilizer — "Duplex basic phosphate"	14,528	14,683	155	1.1
Fertilizer — Sulphate of ammonia	117,496	133,798	16,302	12.2
Ammonia (as liquor)	3,620	5,393	1,773	32.9
Benzol products	113,354 Bbl.	119,109 Bbl.	5,755 Bbl.	4.8
Universal Portland cement	12,499,000	11,960,000	539,000*	4.5*

*Increase over 1920.

Employees and Pay Rolls

The average number of employees in the service of all companies during the year, and the total salaries and wages paid in comparison with corresponding results for the preceding year were as follows:

Employees of	1921 Number	1920 Number	1919 Number
Manufacturing properties	133,963	200,991	188,550
Coal and coke properties	22,451	25,889	24,595
Iron ore properties	11,183	11,517	12,425
Transportation properties	20,010	24,643	23,132
Miscellaneous properties	4,093	4,305	3,404
Total	191,700	267,345	252,106
Total salaries and wages paid	$332,887,505	$581,556,925	$479,548,040
Average earnings per employee per day during 1921:			
All employees, exclusive of general administrative and selling force	$5.61	$6.96	$6.12
Total employees, including general administrative and selling force	$5.73	$7.00	$6.17

Miscellaneous

Accident Prevention—The total expended by the Corporation and the subsidiary companies during the year for safety work was $1,061,685, compared with an outlay of $1,420,456 in the preceding year. The average number of accidents of all kinds per 100 em-

Inventories

		Dec. 31, 1921	Dec. 31, 1920
Ores—Iron, manganese and zinc		$84,725,188	$79,430,633
Limestone, fluxes and refractories		4,440,739	6,021,870
Coal, coke and other fuel		13,054,195	10,587,353
Pig iron, scrap, ferromanganese and spiegeleisen		18,869,057	19,544,070
Pig tin, lead, spelter, copper, nickel, aluminum and dross and skimmings		7,714,557	11,980,704
Rolls, molds, stools, annealing boxes, etc.		13,123,821	15,788,150
Ingots—Steel		1,573,879	2,541,799
Blooms, billets, slabs, sheet and tinplate bars, etc.		22,782,293	20,542,256
Wire rods		1,363,220	1,880,580
Skelp		1,785,049	2,391,445
Finished products		56,599,667	68,146,896
Manufacturing supplies, stores and sundry items not otherwise classified		37,050,148	57,807,450
Mining supplies and stores (for ore and coal properties)		7,291,199	9,914,547
Railroad supplies and stores		7,953,241	10,481,934
Merchandise of supply companies		1,363,816	1,880,723
Material, labor and expense locked up in uncompleted bridge, structural and other contract work	$1,850,115		
Less bills rendered on account	825,583		
		1,024,532	9,501,058
Stocks abroad and on consignment		17,260,930	15,681,950
Material in transit		4,239,093	9,240,079
Total		$302,214,624	$353,363,497
Less, inventory reserve		60,710,255	95,000,000
Balance		$241,504,369	$258,363,497

ployees in 1921 showed a decrease of 19.6 per cent compared with the previous year. The previously established low record for serious and fatal accidents was maintained. In comparison with the record in 1906, this class of accidents per 100 employees in 1921 was 53.2 per cent less than in the former year.

Accident Relief—The disbursements made by the subsidiary companies during the year for work accidents (including accruals not yet actually payable under State compensation laws) was $4,409,211, compared with an outlay of $5,634,263 in 1920. Of the total disbursed in 1921, upwards of 90 per cent of the same was paid or is payable directly to the injured employees or their families.

Sanitation—The expenditures made during 1921, in providing modern sanitary facilities throughout the plants, mines and departments, for the health and comfort of the employees, totaled $3,615,150, compared with an outlay of $4,227,263 in the previous year. At the close of the year there were in and about the plants and works 1989 comfort stations with adequate toilet facilities, including 21,814 washing faucets and basins, 3741 showers and 144,003 lockers, also 3979 sanitary drinking fountains.

Housing and Welfare—In addition to the capital expenditures made during the year for additional housing facilities for employees and development of town sites in connection therewith, previously mentioned in this report, the subsidiary companies had at the close of 1921 advanced or loaned to employees the net sum of $8,479,031 on contracts or mortgages, carrying interest at 5 per cent and payable in installments over a long period of years, to assist them in the construction or purchase of homes under the Corporation's home-owning plan. The efforts of the subsidiary companies in general welfare and educational work for their employees and their families have been consistently continued.

Pittsburgh Foundrymen's Association

Louis L. Vayda, Bacharach Industrial Instrument Co., Pittsburgh, was the speaker at the regular monthly meeting of the Pittsburgh Foundrymen's Association at the General Forbes Hotel last evening, giving an interesting talk on the blast meter, a product of his company for recording the velocity and volume of air passing through the intake into the combustion chamber of the cupola. The association was asked to indorse the standard pig iron contract which is being advocated by the National Association of Purchasing Agents, but deferred action pending the report by a committee which will study the contract and report at the April meeting of the association.

WORKING ON THE TARIFF

Rates Tentatively Agreed Upon May Be Changed by Senate Committee

Washington, March 21.—Differences of opinion as to rates of duties and the composition of the free list still remain to be worked out in connection with a number of items in the permanent tariff bill and in consequence it still is being considered by the Senate Committee on Finance. It is understood that even where many duties have been determined upon they have been named tentatively only while the administrative features that have been the subject of considerable discussion have been proposed but not definitely prepared.

Most of the steel schedule is said to have been closed tentatively, with the hope that it may be permanently left as it is for reporting to the Senate, but there still are some products upon which the committee has not reached an agreement. The principal ones relate to manganese ore and ferromanganese, according to reports, and it is said the committee will vote on these items tomorrow.

Manganese ore had already been placed on the free list, according to a well-informed source, but protests are said to have followed the report that this had been done and to have had the effect of bringing the subject up again. The disposition of ferromanganese had not been decided upon even tentatively, it is said, but consideration has been given to the fixing of a duty of 1c. per pound on this ferroalloy, although steel makers are known to consider this duty entirely too high, and want it placed on the free list, or only a nominal duty fixed. The Fordney bill carries a duty of 1c. per pound of metallic manganese on manganese ore and a duty of 2 1/5c. per pound on ferromanganese when containing in excess of 1 per cent of carbon and 2 1/5c. per pound and 28 per cent ad valorem when containing less than 1 per cent of carbon.

Administrative Features

The administrative features are the source of a great deal of conflict of opinion, and as is well known, Chairman Fordney of the House Committee on Ways and Means has said that he would not accept any bill from the Senate that did not carry the American valuation plan. There are those on the Senate Committee on Finance who oppose this principle, but are ready to accept it in order to prevent an impasse with the House, if possible.

Accordingly, the Senate Committee has tentatively adopted the American valuation plan direct, together with a proposal to base duties on the American wholesale selling price.

Foreign and Domestic Shipments

	1921 Tons	1920 Tons	Decrease or Increase Tons	Per Cent
Domestic Shipments				
Rolled steel and other finished products	6,832,038	12,453,243	5,621,205	45.1 Dec.
Pig iron, ingots, ferromanganese and scrap	142,715	341,563	198,848	58.2 Dec.
Iron ore, coal and coke	618,729	1,212,811	594,082	49.0 Dec.
Sundry materials and by-products	103,265	175,735	72,470	41.2 Dec.
Total tons all kinds of materials, except cement	7,696,747	14,183,352	6,486,605	45.7 Dec.
Universal Portland cement (bbl.)	12,211,285	11,380,260	831,025	7.3 Inc.
Export Shipments				
Rolled steel and other finished products	1,126,735	1,645,464	518,669	31.5 Dec.
Pig iron and scrap	978	6,979	6,001	86.0 Dec.
Sundry materials and by-products	80,384	55,657	24,727	44.4 Inc.
Total tons all kinds of materials	1,208,157	1,708,100	499,943	29.3 Dec.
Aggregate tonnage of rolled steel and other finished products shipped to both domestic and export trade	7,958,833	14,098,707	6,139,874	43.5 Dec.

Total value of business (covering all of above shipments, including cement and completed steamships delivered and other business not measured by the ton unit)	1921	1920	Decrease Amount	Decrease Per Cent
Domestic (not including intercompany sales)	$563,093,812	$1,071,739,500	$508,645,688	47.5
Export	92,313,756	147,905,404	55,591,648	37.6
Total	$655,407,568	$1,219,644,904	$564,237,336	46.3

Iron and Steel Markets

FURTHER IMPROVEMENT

Increased Buying of Steel and Larger Production

Stiffening in Prices of Heavy Products—New Construction Expanding

The improvement in the steel trade, both in demand and in rate of operation, has gone farther in the past week. The situation as to prices is stronger, though the 1.50c. basis on plates, structural shapes and bars, for which more large producers are holding, is not established thus far by important transactions. The week has seen the closing of considerable business on which lower quotations were out.

Reports of an expected announcement of the 1.50c. price by the Steel Corporation have not been borne out, price announcements from that source having been out of vogue for some time.

The percentage of active capacity for the entire industry is evidently close to 60. Current production of ingots in the Pittsburgh, Youngstown and Wheeling districts is put at 60 to 65 per cent of capacity.

The Carnegie Steel Co., which has reached a 65 per cent operation, is preparing to blow in six additional blast furnaces in the next 10 days, bringing the number up to 35 out of 59. The starting up of the company's Farrell, Pa., steel plant, which has been shut down nearly a year, leaves only three of its steel works idle, these being high cost plants.

Sentiment is divided as to the basis and the continuance of the present increased demand for steel. With almost no forward buying, the large call for quick delivery indicates the scant stocks of manufacturing consumers. But conditions in dependent industries still present many variations.

New construction, railroad and automobile activities figure more largely in the market. Detroit motor car works are busier. Ford requirements for April amount to 10,000 to 15,000 tons of bars, wire and sheets.

The nearness of the coal strike has made little impression on the finished steel market. Reserves of bituminous coal, at 60,000,000 tons, are estimated at eight weeks' supply and output of non-union mines has reached 60 per cent of total requirements in recent weeks.

Tie plates figure largely in railroad negotiations. Including 2500 tons for the Missouri Pacific, 5000 tons for the Northern Pacific and 2000 tons for the Illinois Central, the total is fully 12,000 tons. Some 343 passenger service cars have been inquired for, of which 250 are for the Pennsylvania, and 50 electric cars have been bought by the Southern Pacific.

A 5000-ton order for 16-lb. rails for Japan will be rolled at a western Pennsylvania mill.

Fabricated steel lettings of the week, taking in only the sizable bridge and building projects, exceed 40,000 tons, though for all of February, according to the records of the Bridge Builders and Structural Society, the total was 78,700 tons. March promises to be the largest month in structural steel in over 20 months. To the pending list of structural business was added over 20,000 tons, and round lots of reinforcing bars are under inquiry.

Effective March 20, an advance of $2 per ton was made by several Central Western producers of sheet bars and billets. Sheet mill operations have increased rather more rapidly than the supply of sheet bars.

The pig iron market is showing greater firmness in prices. This is due in part to uncertainty as to what effect the expected strike of coal miners will have on prices of coke, and in part to increased foundry melt. Buying in the East and the Central West has amounted to a considerable tonnage, made up to a large extent of moderate orders for early delivery. Eastern Pennsylvania and Buffalo furnaces have taken much of the new business, but furnaces along the lakes have also had their full share.

The first large contract for manganese ore from the Caucasus since the war involves the sale of 50,000 tons to an Eastern producer of ferromanganese. For 52 per cent ore the basis was 24½c. per unit.

At Chicago a situation has developed in which some sellers of heavy melting steel have paid higher prices, in covering short sales, than were paid by steel mills. The highest price paid by a mill there was $12.75, whereas dealers have bought at as high as $13.25.

Early announcement is looked for of an important consolidation in the machinery trade in which seven machine tool companies will be included with other large interests.

Pittsburgh

PITTSBURGH, March 21.

Further effect of the recent price stabilizing movement in steel products has been felt in the past week, which has been marked by a heavy volume of orders and a substantial increase in the activities of the plants in this and adjacent district. The Carnegie Steel Co. last week operated around 65 per cent of its capacity, one important unit having turned out full theoretic capacity production of ingots and this week's indications point to an even higher percentage. There has been substantial increase in the operations of the American Sheet & Tin Plate Co. and the other subsidiaries have at least maintained the recent rate. Valley steel makers have added both to steel works and finishing mill activities and there also has been some gain with the leading independents in the Wheeling district. Not much change has taken place in independent plant activities here in Pittsburgh, but the recent rate, which was high, is fully maintained. A conservative estimate of current production of ingots in the Pittsburgh, Youngstown and Wheeling districts is between 60 and 65 per cent of capacity.

There is still a considerable divergence of opinion as to whether the present activity is the beginning of a sustained buying movement or is merely a bulge. Some assert that this is the beginning of an active market, but others are not certain, pointing out the almost complete absence of forward buying and the fact that buyers still are refraining from building up stocks at current prices. On the other hand, the fact

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Mar. 21, 1922	Mar. 14, 1922	Feb. 21, 1922	Mar. 22, 1921
No. 2X, Philadelphia†	$21.96	$21.96	$21.34	$27.26
No. 2, Valley furnace†	19.00	19.00	18.75	25.00
No. 2, Southern, Cin'ti†	19.50	19.50	20.00	29.50
No. 2, Birmingham, Ala.†	15.00	15.00	15.50	25.00
No. 2 foundry, Chicago*	20.00	20.00	20.00	25.00
Basic, del'd, eastern Pa.	20.50	19.84	19.84	25.00
Basic, Valley furnace	18.00	18.00	17.75	23.00
Val. Bessemer, del. P'bgh.	21.46	21.46	24.46	26.96
Malleable, Chicago*	20.00	20.00	20.00	25.50
Malleable, Valley	19.00	19.00	19.00	25.00
Gray forge, Pittsburgh	20.71	20.71	20.71	25.96
L. S. charcoal, Chicago	26.00	26.00	30.50	38.50
Ferromanganese, seaboard	62.50	62.50	62.50	90.00

Rails, Billets, etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$40.00	$40.00	$40.00	$47.00
Bess. billets, Pittsburgh	28.00	28.00	28.00	38.50
O.-h. billets, Pittsburgh	28.00	28.00	28.00	38.50
O.-h. sheet bars, P'gh.	29.00	29.00	29.00	38.50
Forging billets, base, P'gh.	32.00	32.00	32.00	43.50
O.-h. billets, Phila.	33.74	33.74	33.74	44.24
Wire rods, Pittsburgh	36.00	36.00	35.00	52.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	1.40	1.40	1.50	2.35
Light rails at mill	1.40	1.40	1.40	2.35

Finished Iron and Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	1.70	1.71	1.76	2.45
Iron bars, Chicago	1.60	1.55	1.55	2.60
Steel bars, Pittsburgh	1.40	1.40	1.40	2.00
Steel bars, Chicago	1.60	1.50	1.50	2.38
Steel bars, New York	1.78	1.78	1.78	2.38
Tank plates, Pittsburgh	1.40	1.40	1.40	2.00
Tank plates, Chicago	1.60	1.50	1.50	2.38
Tank plates, New York	1.78	1.78	1.78	2.38
Beams, Pittsburgh	1.40	1.40	1.40	2.10
Beams, Chicago	1.60	1.50	1.50	2.48
Beams, New York	1.78	1.78	1.78	2.48
Steel hoops, Pittsburgh	1.80	1.80	1.90	2.80

Sheets, Nails and Wire, *Per Lb. to Large Buyers:*	Mar. 21, 1922 Cents	Mar. 14, 1922 Cents	Feb. 21, 1922 Cents	Mar. 22, 1921 Cents
Sheets, black, No. 28, P'gh.	3.00	3.00	3.00	3.85
Sheets, galv., No. 28, P'gh.	4.00	4.00	4.00	5.00
Sheets, blue an'l'd, 9 & 10	2.25	2.25	2.25	3.00
Wire nails, Pittsburgh	2.40	2.40	2.40	3.00
Plain wire, Pittsburgh	2.25	2.25	2.15	3.00
Barbed wire, galv., P'gh.	3.05	3.05	3.05	3.85
Tin plate, 100-lb. box, P'gh.	$4.60	$4.60	$4.75	$7.00

Old Material, Per Gross Ton:				
Carwheels, Chicago	$17.00	$16.50	$15.00	$14.50
Carwheels, Philadelphia	16.00	16.00	15.00	18.00
Heavy steel scrap, P'gh.	15.00	15.00	14.00	14.00
Heavy steel scrap, Phila.	13.50	12.50	12.00	13.00
Heavy steel scrap, Ch'go	12.50	12.50	11.50	12.00
No. 1 cast, Pittsburgh	15.75	15.75	16.00	21.00
No. 1 cast, Philadelphia	17.25	17.25	16.50	19.00
No. 1 cast, Ch'go (net ton)	14.25	14.25	13.50	14.00
No. 1 RR. wrot, Phila.	15.50	15.50	14.50	17.00
No. 1 RR. wrot, Ch'go (net)	11.75	11.25	10.50	11.00

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$3.25	$3.25	$3.25	$4.25
Foundry coke, prompt	4.25	4.25	4.00	5.50

Metals, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Lake copper, New York	13.00	13.00	13.00	12.12½
Electrolytic copper, ref'y.	12.75	12.75	12.75	11.87½
Zinc, St. Louis	4.72½	4.65	4.50	4.70
Zinc, New York	5.07½	5.00	4.85	5.20
Lead, St. Louis	4.42½	4.40	4.40	4.00
Lead, New York	4.70	4.70	4.70	4.00
Tin, (Straits), N. Y.	29.12½	29.00	29.62½	28.50
Antimony (Asiatic), N. Y.	4.20	4.20	4.40	5.25

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Composite Price, March 21, 1922, Finished Steel, 2.019c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets

These products constitute 88 per cent of the United States output of finished steel

Mar. 14, 1922,	2.019c.
Feb. 21, 1922,	2.005c.
Mar. 22, 1921,	2.757c.
10-year pre-war average,	1.689c.

Composite Price, March 21, 1922, Pig Iron, $18.38 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

Mar. 14, 1922,	$18.38
Feb. 21, 1922,	18.35
Mar. 22, 1921,	24.38
10-year pre-war average,	15.72

that all of the independent companies have swung into line at 1.40c. Pittsburgh for plates, shapes and bars, is taken to mean that these companies have built up a substantial back log at the old basis. Some support is lent the belief in a continued betterment in business by the fact that the Carnegie Steel Co. is actively making ready to put on six additional blast furnaces in the next week or so. These include one Isabella, one Duquesne, one Carrie, one Ohio, and two Farrell, Pa., furnaces. These additions will bring the total number of active Carnegie furnaces to 35 out of a total of 59 and it is hardly conceivable that the company would take this step unless satisfied that good business is ahead. The starting up of the Farrell, Pa., works of this company, which has been down for about a year, will leave only three of its steel works idle, these being high-cost plants.

Although practically all makers of plates, shapes and bars now are holding to 1.50c., Pittsburgh, the great bulk of the tonnage which has been booked in the past week has been at the lower prices previously quoted and only a very small and really unimportant part of the business has been entered at the new price. Sheet prices are firmly maintained and an advance of $2 a ton just announced in sheet bars may possibly be followed by an advance in sheets. In the minor products, betterment in business has not been accompanied by any appreciable stiffening in prices. Indeed, it is commented upon that in the face of a higher market for hot-rolled bars, prices of cold-finished steel bars have actually weakened slightly.

The recently established price of $18, Valley furnace, for basic iron has been strengthened by another sale of 1500 tons at that price.

Scrap dealers short of the steel works grades have been paying stiff prices in covering them, but there has been no advance in the prices offered by melters.

The close proximity of the coal strike is without effect upon the fuel market. It is estimated that present reserve stocks of bituminous coal throughout the country are fully 60,000,000 tons and on the basis of recent consumption this is sufficient to last about eight

weeks. The idea that a suspension of union mine operations will not have a serious effect is strengthened by the fact that non-union mines lately have shown ability to produce up to 5,000,000 tons a week.

Pig Iron.—The best demand continues to be for foundry iron of which we note one purchase for April shipment by a sanitary ware manufacturer of about 4000 tons of No. 2 and No. 2X. The plain No. 2 iron was bought at $19, furnace, but makers seem to have waived the differential on No. 2X, most of which was also bought at $19. There is a pretty steady demand for small tonnages of foundry iron from local foundries and if the sales are bunched with reservations which makers have made for regular customers, the business of the past few weeks would reach fairly heavy proportions. However, reservations cannot well be considered sales until the shipping instructions are received and this sort of business constitutes the greater part of the tonnage. We note another sale of basic iron at $18, Valley furnace, this being of 1500 tons to a Pittsburgh district steel maker and more firmly establishes the market at $18. There is very little interest in Bessemer iron, the largest inquiry being for 250 tons for the Pittsburgh plant of the American Steel Foundries. This grade of iron is still available at $19, Johnstown, but Valley makers are holding to $19.50, and claim to be making small sales at this figure.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.96 per gross ton:

Basic	$18.00
Bessemer	19.50
Gray forge	18.75
No. 2 foundry	19.00
No. 3 foundry	18.75
Malleable	19.00

Ferroalloys.—The attention of the trade is directed toward Washington because of the probability of early action on the tariff. It is understood that the schedules to be reported out by the Senate Finance Committee will show several downward revisions in the ferroalloys rates as compared with those originally proposed. Manganese ore, it is said, will be restored to the free list and a duty of $5 per ton be set up on ferromanganese. This is in line with the demands of the steel makers and is likely to meet opposition from the manganese ore interests, who are said to have allied themselves with the magnesite producers in a combined effort to force favorable action on both products. The rates on ferrosilicon to be reported call for a reduction of ½c. per unit from the original rates on 8 to 20 per cent to 2c.; of ¾c. in 20 to 60 per cent to 2c. and of 1/5c. in 60 to 80 per cent to 3c. Market conditions here show little change. Two Middle Western steel makers recently were buyers of ferromanganese, one taking 800 tons at the full price and the other 1000 tons. The latter sale, however, was not clear cut, having been fastened on to an old contract carrying a much higher price than now prevails. The price remains at $62.50 Atlantic seaboard for American and English 80 per cent material, but there are intimations of an early advance to $65 on domestic material, it being claimed that on to-day's costs the latter price is justified. The Lackawanna Steel Co. inquiry for 1200 tons is reported to be still open. Spiegeleisen prices are weaker, 19 to 21 per cent being quoted at $27.50 to $30 furnace, according to the size of the order and 16 to 19 per cent from $26.50 to $29. We note a sale of 14 to 19 per cent material at $24.25 furnace, to a central Ohio steel maker, the delivered price being about $31. This was a cleanup sale by the maker. Interest in 50 per cent ferrosilicon is small. This material still is available at $55 delivered this and nearby districts.

We quote 78 to 82 per cent ferromanganese, $62.50 c.i.f. Atlantic seaboard for domestic and English. Average 20 per cent spiegeleisen, $27.50 to $30 furnace; 16 to 19 per cent, $26.50 to $29 furnace; 50 per cent ferrosilicon, domestic, $55 to $60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, $36.50; 11 per cent, $39.80; 12 per cent, $43.10; 13 per cent, $47.10; 14 per cent, $52.10; silvery iron, 6 per cent $25; 7 per cent, $26; 8 per cent, $27.50; 9 per cent, $29.50; 10 per cent, $31.50; 11 per cent, $34; 12 per cent, $36.50. The present freight rate from Jackson to New Straitsville, Ohio, into the Pittsburgh district is $4.06 per gross ton.

Billets, Sheet Bars and Slabs.—Effective yesterday, several of the larger producers announced a horizontal advance of $2 per ton. Sheet bars and small billets now are quoted at $31, Pittsburgh and Youngstown, and slabs and large billets at $30. On forging billets, the Carnegie Steel Co., for some time, has been quoting $35 and its new price accordingly is $37. The independent quotation, which has been $32, goes to $34. These prices have not yet found much basis in sales and for the present must be regarded as maximum rather than minimum prices. Most recent business in sheet bars has been at $29, Pittsburgh or Youngstown, with freight equalized to destination. It is reported that a fair sized tonnage of small billets recently was sold at $28, Youngstown, and small tonnages of large billets have changed hands at $28, Pittsburgh. Sheet mill operations have increased a little more rapidly than the production of sheet bars, and several makers are short of bars. Preparations for a resumption at the Farrell, Pa., works of the Carnegie Steel Co. are dictated largely by the sheet bar requirements of Shenango Valley plants of the American Sheet & Tin Plate Co., which hitherto have been drawing supplies from Pittsburgh district plants. The change in the source of supplies will mean a considerable saving in freight charges of the American Sheet & Tin Plate Co.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at $28 to $30; 2 x 2-in. billets, $29 to $31; Bessemer and open-hearth sheet bars, $29 to $31; slabs, $28 to $30; forging billets, ordinary carbons, $32 to $37, all f.o.b. Youngstown or

Wire Rods.—Reports of business at less than $36, Pittsburgh, do not find verification among makers in this district, all of whom insist that $36 is the minimum quotation and that they are refusing business at less. Although a fair tonnage is being moved, all makers say there is room for much improvement. Prices given on page 831.

Steel Skelp.—The attempt to put steel pipe skelp to 1.50c. is not meeting with much success. There has not been much tangible improvement in tubular goods prices and buyers regard 1.40c. as about as high as they should go. There has not been enough business passing, unless inter-company business among the Steel Corporation subsidiaries be included, to really establish the market.

Wire Products.—There is a fairly good run of orders for early delivery, but still an almost complete lack of advance buying. Quoted prices are firmly adhered to by all makers and there are no intimations of an immediate change, but buyers are not yet convinced that this is the time to build up their stocks beyond a point indicated by the demands upon them. Mill operations are on a fairly high rate in this and nearby districts, the average being between 60 to 65 per cent of capacity, taking in rod mill and finishing mill capacity. There is some evidence of stocking by manufacturers.

We quote wire nails at $2.40 base per keg, Pittsburgh, and bright basic and Bessemer wire at $2.25 base per 100 lb., Pittsburgh.

Iron and Steel Pipe.—Demand for merchant pipe in both steel and wrought iron is steady and fairly satisfactory in the aggregate, but large individual purchases are conspicuously lacking, buyers showing a marked inclination against anticipating their needs. Jobbers' stocks are reported to be low but this does not forecast a pinch in the supply later, because makers generally are not committed very far ahead, and most of them are producing somewhat more tonnage than is called for on current orders. The price situation is steadier, due to less anxiety for business. Most of the large line pipe inquiries which were before the trade recently were closed. The largest open inquiry now up is that of the Southern Carbon Co. for 98 miles of 12-in. pipe for a gas line from Monroe to Alexandria, La. Card discounts are given on page 831.

Sheets.—Orders calling for early delivery are numerous and reach a very satisfactory total and moreover are coming from all but one or two of the consuming industries. Bookings by the American Sheet & Tin Plate Co. actually are in excess of its capacity and its schedule for this week calls for the operation of 85 per cent of its sheet mills, as compared with 75 per cent, the recent average. Independent companies also are getting more business, as is evident from the fact that about 65 per cent of the sheet mills of the country are in operation. The one unfavorable feature of the business from the standpoint of manufacturers is that buyers still evince little or no interest

in their future requirements, and that the great bulk of current orders calls for early delivery. Stocks in second hands are admittedly small but buyers do not appear to be convinced that this is the time to stock up. There continues to be remarkably firm adherence to the regular quotations of 3c. base for black, and 4c. base for galvanized, while 2.25c. base for blue annealed is much better established by sales than it was early in the year. Prices are given on page 831.

Tin Plate—New business is of rather unimportant proportions, although some have noted improvement in this direction in the past week or so, but specifications against contracts continue to pour in freely and there is still a very dull engagement of independent capacity. The American Sheet & Tin Plate Co., which has been lagging behind independents in the matter of plant operations, is among those which have had an increase in new business and this week will operate more than 70 per cent of its tin mills, as against its recent average of around 65 per cent. Some of the smaller units which have not much of a backlog are reported to be shading prices occasionally, but as a general rule, $4.60 per base box, Pittsburgh, is minimum on production tin plate.

We quote standard production coke tin plate, $4.60 per base box f.o.b. Pittsburgh for carload lots.

Cold-Finished Steel Bars and Shafting.—One of the anomalies of the situation is that in the face of a firmer market in hot-rolled bars, prices of cold-finished bars have grown slightly weaker. Hitherto, makers of the latter have been endeavoring to hold the market on a basis of 1.90c. Pittsburgh, but have admitted that concessions were being made occasionally. Now, however, the market has definitely settled to a minimum of 1.80c. as a quotation and even less than that has been done in the Cleveland district, where a fair-sized tonnage recently was taken at about 1.75c. Makers quite generally report business as better, but those who buy their hot-rolled bars complain that there is no profit at current prices. Ground shafting is unchanged at 2.25c. base, mill, for carload lots.

Boiler Tubes.—Business gradually is improving, but evidently all makers are not sharing alike and competition is sharp enought to keep prices low and easy. It is reported that some 2-in. 11-gage seamless tubes recently were sold at a lower price than iron tubes of like dimensions. Card discounts are given on page 831.

Rivets.—Business unquestionably is better now than it has been before in several months, but the improvement does not extend to prices, which generally are favorable to buyers. Leading makers are quoting heavy rivets at $2.10 to $2.20 base per 100-lb., Pittsburgh, and are booking a fair number of contracts at these prices. It is admitted, however, that these prices are not minimums on current business, some bolt makers having gone as low as $1.90 to secure orders for early delivery, evidently with an idea of helping plant operations. Prices and discounts given on page 831.

Fluorspar.—Producers generally are quoting $16, f.o.b. mines, for washed gravel fluorspar, 80 per cent calcium fluoride and not over 6 per cent silica, but a steel works interest which recently inquired for 200 tons of 85 per cent reports having had a quotation of $14.75. The freight from Illinois and Kentucky mines to Pittsburgh is $6 per ton.

Iron and Steel Bars.—An eastern producer has notified the local office not to accept any more steel bar business at less than 1.50c. This action put all the independent companies on a base of 1.50c., Pittsburgh, but so far only small sales have been made at this price, the great bulk of the booking having been entered against protective quotations of less. Evidently the Carnegie Steel Co. is heavily booked on steel bars because the two largest bar making units have been running practically full for the past week. New business in reinforcing bars made from new billets, carrying a price of less than 1.50c., is not easily placed and these bars, rolled from old rails, are firmly held at 1.40c. We note no change in iron bars.

We quote steel bars rolled from billets at 1.40c. to 1.50c.; reinforcing bars, rolled from billets, 1.40c. to 1.50c. base; reinforcing bars, rolled from old rails, 1.30c. to 1.40c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—Fabricating shops in this district are not especially well engaged and demands for plain material from them are extremely light. The only important structural awards announced here are 500 tons of steel for bridges for the Nashville, Chattanooga & St. Louis Railroad taken by the American Bridge Co., and 1400 tons taken by the McClintic-Marshall Co. for the new club house of the Indianapolis Athletic Club. The common asking price on structural beams now is 1.50c., but most of the recent bookings have been at $1 to $3 per ton less and it is understood that protection still is out at low quotations against much tonnage. Prices are given on page 831.

Plates.—Some tonnage carrying less than to-day's price has been driven in by the recent advance, but the new quotation as yet has not found much basis in sales. There are intimations that some of the Valley car builders are figuring on substantial inquiries and that orders will be placed in the near future.

We quote sheared plates, ¼ in. and heavier, tank quality, at 1.40c. to 1.50c., f.o.b. Pittsburgh.

Hoops and Bands.—The effort still is being made to restore 1.90c., Pittsburgh, as the price on both hoops and bands, and some business is being taken in hoops at that figure. Business generally is better than it was recently, but the improvement as yet has not embraced prices. The quotable range on hoops, based on sales, still is 1.80c. to 1.90c. and on bands from 1.75c. to 1.90c.

Coke and Coal.—There is no special change in the coke market. Spot tonnages of furnace grade still are moving at from $3.25 to $3.50 per net ton oven, with spot foundry coke $1 per ton higher. The fact that the coal market has not developed more strength makes it impossible for coke producers to put up prices and while the general asking price on furnace grade is $3.50, sales at that figure are few and usually for brands of high reputation. The foundries seem to have fortified themselves against a shortage in the event of a strike by the union coal miners and purchases for stock are not as large and urgent as they were recently. Mine run steam coal is quotable at $2 to $2.25 for union coal and $1.50 to $1.75 for non-union for spot shipment. Mine run by-product coal takes a range of from $1.65 to $2, while mine run gas coal is quoted at $2.15 for non-union and $2.40 for union coal.

Old Material.—High prices still are being paid for steel works grades by dealers short against sales, but melters are slow to follow advances thus established, and the market, based on what is being paid by consumers, is not quotably higher than it was a week ago. Heavy melting steel has been sold at $16 and even $16.25 delivered Pittsburgh district plants, but those to whom the material is being shipped deny having paid more than $15.50 and their current offering price is $15. Possibly if some of the mills were in the market for round tonnages, they would not be able to buy at less than $16, but the trouble is that they are out of the market, and furthermore are strongly against paying any advance.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh	$15.00 to $15.50
No. 1 cast, cupola size	15.75 to 16.25
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	15.00 to 15.50
Compressed sheet steel	13.00 to 13.50
Bundled sheets, sides and ends	12.00 to 12.50
Railroad knuckles and couplers	15.50 to 16.00
Railroad coil and leaf springs	15.50 to 16.00
Low phosphorus standard bloom and billet ends	17.50 to 18.00
Low phosphorus plates and other grades	17.00 to 17.50
Railroad malleable	13.50 to 14.00
Iron car axles	23.00 to 24.00
Locomotive axles, steel	21.00 to 22.00
Steel car axles	15.50 to 16.00
Cast iron wheels	15.50 to 16.00
Rolled steel wheels	15.50 to 16.00
Machine shop turnings	10.50 to 11.00
Sheet bar crop ends	15.00 to 16.00
Heavy steel axle turnings	12.50 to 13.00
Short shoveling turnings	12.00 to 12.50
Heavy breakable cast	15.00 to 15.50
Stove plate	12.50 to 13.00
Cast iron borings	12.00 to 12.50
No. 1 railroad wrought	12.50 to 13.00

Chicago

CHICAGO, March 21.

The steel market shows increasing strength. The leading interest has just closed the biggest week's sales in nearly a year, and its operations have again advanced to a higher plane, its present steel output being 69 per cent of ingot capacity. The Inland Steel Co. continues to operate at 60 per cent. Prompt delivery is no longer so readily obtainable on plates, shapes and bars and the prices of these commodities are now definitely at a minimum of 1.60c., Chicago.

Structural business is considerably more active and railroad purchases of track supplies and other materials are liberal. For a new ore dock at Superior, Wis., requiring nearly 12,000 tons of fabricated steel, the Great Northern has already bought the reinforcing bars, amounting to 1400 tons, from a Buffalo mill. By arranging to use its own boats to ship the material, the mill was able to name a delivered price which Chicago producers were unable to meet. It is reported that a quotation of 1.45c. delivered was named, but confirmation is lacking. In all of the current market activity there is little indication that the motive for buying is precautionary. It is known that the mills and furnaces are well supplied with fuel and that unless the railroads are crippled, deliveries of steel and iron are not likely to be interrupted. Even in the coke market the threatened coal strike has frightened few buyers into making large purchases.

Pig Iron.—While buying is lacking in spectacular features, the aggregate of current purchases is substantial and the leading merchant reports that shipments from furnaces are steadily increasing. Prominent among current inquiries may be mentioned 1000 tons of foundry wanted by the Crane Co., Chicago, 500 tons of foundry asked for by the Arcade Mfg. Co., Freeport, Ill., and 2100 tons of Southern foundry desired for April to September delivery by the Rundle Mfg. Co., Milwaukee. A north Chicago foundry has bought 700 tons of foundry at the ruling local furnace price and a local sanitary manufacturing company has placed 500 tons of foundry with the Southern furnace making water and rail shipments. A Kalamazoo melter is reported to have closed for 500 tons of foundry at $14.75, base Birmingham, or 25c. under the ruling price of furnaces shipping all rail. A local company is inquiring for several hundred tons of low phosphorus and standard Bessemer for delivery at an Eastern plant. The recent reduction in the price of charcoal iron gives that iron an advantage of about $1 a ton delivered in the Twin Cities over Chicago coke iron, and puts it in a competitive position with coke iron at Muskegon and other Michigan cities. It is reported that one result of the reduction was the placing of an order for 20,000 tons of charcoal by a large railroad car and carwheel manufacturer.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago		$26.00
Northern coke, No. 1, sil. 2.25 to 2.75		20.50
Northern coke, foundry, No. 2, sil. 1.75 to 2.25		20.00
Northern high phos		20.00
Southern foundry, sil. 1.75 to 2.25	$20.77 to	21.67
Malleable, not over 2.25 sil		20.00
Basic		20.00
Low phos., Valley furnace, sil. 1 to 2 per cent copper free		30.00
Silvery, sil. 8 per cent		32.82

Ferroalloys.—The market presents no new developments.

We quote 78 to 82 per cent ferromanganese, $70.90, delivered; 50 per cent ferrosilicon, $56 to $57.50, delivered; spiegeleisen, 16 to 18 per cent, $40.10, delivered.

Railroad Equipment.—The Chicago, Milwaukee & St. Paul is expected to close for 1000 box cars to-day or to-morrow. The Northwestern has added 300 ballast cars and 50 10,000-gal. tank cars to its previous inquiry, making a total of 3100 cars. The Chicago & Eastern Illinois is inquiring for five Pacific type locomotives. The Pennsylvania is in the market for 250 passenger service cars.

Cast Iron Pipe.—Milwaukee has awarded 1350 tons of four to 16-in. to the Clamorgan Pipe & Foundry Co., Lynchburg, Va., at $42.20, delivered or the equivalent of $32.47, Birmingham. It has also let 145 tons of special castings to the American Cast Iron Pipe Co. at $85 a ton. The same city will take bids March 29 on 5620 tons of 54-in. and 150 tons of specials and 1130 tons of 36-in and 30 tons of specials. James B. Clow & Sons were the successful bidders on 1500 tons for Toledo and 300 tons for Elyria, Ohio. Pending business includes:

Lima, Ohio, 2000 tons, 4 to 20-in., March 21.
Duluth, Minn., 1000 tons, 4 to 12-in., March 24.
Kewaunee, Ill., 17,260 ft. of 6-in., April 3.
Park Ridge, Ill., 530 tons, let to contractor.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., $46.10 to $47.10; 6-in. and above, $42.10 to $43.10; class A and gas pipe, $3 extra.

Bars.—The fact that all of the bar mills of the Illinois and Inland Steel companies are running double turn and no buyer now entering the market can be sure of delivery earlier than four to six weeks indicates the improved position of mild steel bars. Buying during the past week has been brisker than for over a year and it is evident that orders are not merely for replenishment purposes but in some cases cover anticipated seasonal requirements. Business is coming from widely distributed sources, farm implement makers alone being notable for their lack of buying. Even the implement industry, however, is in a more optimistic mood and is making some purchases here and there to round out existing stocks of material. Mill prices on soft steel bars have stiffened and are now not lower than 1.60c., Chicago. In the reinforcing field, business is growing more active as the building season draws near. The Corrugated Bar Co. will furnish 300 tons for the Morrell Packing Co., Ottumwa, Iowa. The Concrete Steel Co. has the contract for 300 tons for the Admiral Hotel, Chicago. Pending business includes the Bankers' Life and Central Life insurance buildings, Des Moines, Iowa, 500 tons each; the Chicago, Burlington & Quincy Freight House, Chicago, 800 tons; a theatre at Fort Wayne, Ind., 250 tons; the Illinois Central Railroad, Chicago, 150 tons; and a sewage disposal plant, Lima, Ohio, 100 tons. Warehouse prices on deformed steel bars range from 1.75c. to 2c., Chicago. Bar iron has been generally advanced to 1.60c., Chicago, and a fair tonnage has been placed at that price. While mill bookings are not yet all that might be desired, the tendency seems to be towards gradual improvement. Hard steel bar prices remain unchanged, with buying somewhat better.

Mill prices are: Mild steel bars, 1.60c., Chicago; common bar iron, 1.60c., Chicago; rail carbon, 1.50c., mill or Chicago.

Jobbers quote 2.28c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 1.90c. base. Deformed bars, 1.75c. to 2c. Hoops, 3.13c. Bands, 2.88c.

Sheets.—Prices are firm and business is increasing. The resistance of buyers is commencing to disappear as prices of plates, shapes and bars grow firmer and the restoration of the normal differentials between those products and sheets seems less remote.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Wire Products.—Jobbers are buying nails and wire oftener and more liberally, although even yet a hesitancy to lay in stocks is evident. Prices are firm, however, and that caution may soon give way to a general endeavor to cover ahead at present levels is predicted in some quarters. Wire rods are also stiffening, the soft spots in the market noted a week ago having disappeared and a minimum of $36, Pittsburgh,

being the present ruling price. For mill prices, see finished iron and steel f.o.b. Pittsburgh, page 831.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, $2.85 per 100 lb.; No. 9 and heavier bright basic wire, $3 per 100 lb.; common wire nails, $3 per 100 lb.; cement coated nails, $2.50 per keg.

Rails and Track Supplies.—There is no abatement in the demand for track materials. The Northern Pacific is in the market for 5,000 tons of tie plates and is also expected to buy spikes and bolts. The Illinois Central is inquiring for 2000 tons of tie plates. While prices of bolts and spikes are still weak, tie plates appear to be strengthening with $35 per net ton more generally named as a minimum quotation. New rail business is light, but specifications against contracts are coming in at a satisfactory rate.

Standard Bessemer and open hearth rails, $40; light rails rolled from new steel, 1.50c. to 1.60c., f.o.b. makers' mills.

Standard railroad spikes, 2c. to 2.10c., Pittsburgh; track bolts with square nuts, 3.05c. to 3.10c., Pittsburgh; tie plates, steel and iron, 1.65c. to 1.75c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Bolts and Nuts.—Business is steadily, though slowly, improving, and prices are tending to stiffen, particularly in quotations on second quarter business. There is a more general tendency to adhere to the discounts on page 831. Quoting f.o.b. works on the products manufactured in the West and f.o.b. Pittsburgh, on commodities made largely in the East. Reports from the automobile industry are more encouraging every week, several manufacturers now being on a 100 per cent operating basis while others average between 70 and 75 per cent.

Jobbers quote structural rivets, 3c.; boiler rivets, 3.10c.; machine bolts up to ¾ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 to 10 off; carriage bolts up to ¾ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, $3.75 off; blank nuts, $4 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Plates.—One of the best indications of the growing strength of the market was the placing of liberal orders for plates, shapes and bars by the jobbing interests. The warehouses have a reputation for buying at the bottom on the eve of an advance and in the opinion of many keen observers they did not err in their judgment on this occasion. Certain it is that the immediate effect of this concentration of buying has been to bring the prices of all producers up to a minimum of 1.60c., Chicago, on these products. Specifications for plates continue to be received from car builders in steady volume and orders from all sources are more numerous.

The mill quotation is 1.60c. Chicago. Jobbers quote 2.38c. for plates out of stock.

Warehouse Prices.—The reductions in plates, shapes and bars announced by local jobbers last week were particularly interesting because they constituted a recognition of the abandonment of the Pittsburgh base. This fact is clearly brought to light through the adoption of increased extras for 3/16-in. plates, 84-in. and 96-in. wide, sizes not rolled in the Chicago district. These extras have been advanced to 45c. for 84-in. and 75c. for 96-in. plate, the advances being necessary to cover the freight from the Pittsburgh district.

Structural Material.—Interest is centered in the Great Northern ore dock at Superior, requiring 11,850 tons, as was noted in THE IRON AGE a week ago. The same railroad is in the market for 750 tons of structural steel for bridge reinforcement. While these inquiries are conspicuous because of the large tonnage involved, the market in general shows healthy improvement, both lettings and inquiries being on the increase. Mill bookings are steadily accumulating, so that plain material is no longer readily available for prompt delivery and unless the sizes desired happen to fit in with current rolling schedules, shipment earlier than four to six weeks cannot be counted on. At the same time plain material prices have stiffened and are now quoted at a minimum of 1.60c., Chicago. Recent fabricating lettings include:

Chicago, Rock Island & Pacific Railway, bridge over Sylvan Slough, Rock Island, Ill., 1662 tons, to Fort Pitt Bridge Co.

Biltmore Hotel, Los Angeles, Cal., 5250 tons, to Llewellyn Iron Works.

Standard Oil Co., storage tank, Muskegon, Mich., 268 tons, to American Bridge Co.

University of Iowa, addition to grandstands, Iowa City, 445 tons, to American Bridge Co.

Indiana & Michigan Electric Co., power house addition, South Bend, Ind., 208 tons, to Elkhart Bridge & Iron Co.

Bridge over East Cadron Creek, Conway, Ark., 114 tons, to Midland Bridge Co.

Majestic Theatre, Houston, Tex., 1000 tons, to Virginia Bridge & Iron Co.

United Verde Copper Co., smelter and mill building, Arizona, 2200 tons, to Kansas City Structural Steel Co.

Furniture Exhibit Building, Chicago, 900 tons, to Duffin Iron Works.

Rhinelander Paper Co., finishing room, Rhinelander, Wis., 100 tons, to Worden Allen Co.

Milwaukee Electric Railway & Light Co., addition Kinnickinnic Avenue Garage and Service Station, 100 tons, to Worden Allen Co.

Pending business includes:

Guaranty Building, Indianapolis, 600 tons, bids in.

Randolph Hotel, Chicago, 6000 tons.

Masonic Temple, Aurora, Ill., 300 tons, bids in.

Federal Reserve Bank, Minneapolis, superstructure, 900 tons, bids to be asked soon.

Bridge over Panana River, Nenana, Alaska, 2883 tons.

The mill quotation on plain material is 1.60c., Chicago. Jobbers quote 2.38c. for plain material out of warehouse.

Old Material.—The steady improvement in finished steel business, together with recent heavy purchases of scrap by local steel mills, has materially strengthened the old material market. Speculative buying by dealers in anticipation of further advances is again becoming a feature of the local trade. In a number of instances sellers have paid higher prices for material than consumers have paid. In some cases they were forced to do so because they were caught short, but on the whole a bullish atmosphere pervades the market and dealers are showing a tendency to bid prices up in competition with each other. The highest price for heavy melting thus far reported as having been paid by a mill is $12.75, delivered, yet dealers have bought at as high as $13.25. While consumers are growing more cautious as dealers' asking prices advance, some moderate consumptive purchases of certain grades have been made at higher prices. This is notably true of some iron mill grades and to a lesser extent of cast and malleable grades. At the moment the future course of the market is uncertain. Whether, as the dealers expect, consumers will continue to pay advancing prices, or whether the market will be stimulated to a point where a reaction will occur, remains to be seen. Railroad lists include the Chicago and Alton, 600 tons; the Rock Island, 3000 tons, and the Chicago Great Western, 560.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	$17.00 to $17.50
Relaying rails	20.00 to 25.00
Cast iron car wheels	17.00 to 17.50
Rolled or forged steel car wheels	14.50 to 15.00
Steel rails, rerolling	13.75 to 14.00
Steel rails, less than 3 ft	13.75 to 14.00
Heavy melting steel	12.50 to 12.75
Frogs, switches and guards cut apart	12.50 to 12.75
Shoveling steel	11.75 to 12.25
Low phos., heavy melting steel	14.50 to 15.00
Drop forge flashings	8.50 to 9.00
Hydraulic compressed sheet	8.50 to 9.00
Axle turnings	8.50 to 9.00
Per Net Ton	
Iron angles and splice bars	15.00 to 15.50
Steel angle bars	12.25 to 12.50
Iron arch bars and transoms	16.50 to 17.00
Iron car axles	20.00 to 20.50
Steel car axles	13.75 to 14.25
No. 1 busheling	9.50 to 10.00
No. 2 busheling	6.25 to 6.75
Cut forge	11.50 to 11.75
Pipes and flues	8.00 to 8.50
No. 1 railroad wrought	11.75 to 12.00
No. 2 railroad wrought	11.50 to 11.75
Steel knuckles and couplers	13.00 to 13.50
Coil springs	13.50 to 13.75
No. 1 machinery cast	14.25 to 14.75
No. 1 railroad cast	13.50 to 14.00
Low phos. punchings	11.50 to 12.00
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	5.75 to 6.25
Cast borings	7.25 to 7.75
Stove plate	13.00 to 13.50
Grate bars	11.50 to 13.00
Brake shoes	11.50 to 12.00
Railroad malleable	12.50 to 13.00
Agricultural malleable	12.50 to 13.00

Philadelphia

PHILADELPHIA, March 21.

All branches of the iron and steel industry show improvement both as regards volume of business and prices. A conspicuous feature of the week is the betterment in steel plant operations. The Cambria works of the Midvale Steel & Ordnance Co. at Johnstown, Pa., is now on a 75 per cent schedule. The Bethlehem Steel Co. plants are doing practically as well. The Pencoyd works of the American Bridge Co. is operating at 50 per cent or better. Most of the smaller independent mills in the East are turning out about one-third of their normal output.

In steel prices the market has improved to the extent that 1.40c., Pittsburgh, now clearly appears to be the bottom on plates, shapes and bars, the only exception being that some business was booked in the past week at lower prices on which commitments had been made prior to the price advance. The leading interest is understood to be quoting its regular trade 1.40c., Pittsburgh, on plates, shapes and bars, but has quoted 1.50c. on some inquiries. One independent mill is offering concrete reinforcing bars made from new steel at 1.40c., Pittsburgh, but otherwise all of the independents seem to be adhering firmly to 1.50c. on all three products.

Pig iron is firmer and some furnaces are considering an advance of 50c. a ton, which would make No. 2 plain iron $20.50, furnace. The scrap market is also considerably firmer.

The coal strike set for April 1 is not seriously affecting the market as yet, for the reason that large consumers have plenty of coal in stock for at least 60 to 90 days' operation. The railroads are also well supplied. An indication of the calm with which the situation is being met industrially is the softening in the price of bituminous coal and the falling off in demand. Large soft coal users have offered only $2.30 a ton this week, which is declared to be less than the cost of mining.

Pig Iron.—A much improved tone exists in the pig iron market. Eastern Pennsylvania furnaces have booked substantial tonnages within the past 10 days, mostly in the New York and New England districts, and are not concerned about further selling until the coke situation becomes clarified. Furnace coke is strong at $3.50, Connellsville, and because of this high price some of the Eastern furnaces have not contracted for second quarter. If the coal strike should develop further strength in coke prices, it is possible that at least two or three furnaces in this district will go out of blast rather than attempt to operate under higher cost conditions. It is stated that it is now costing eastern Pennsylvania furnaces from $19.50 to $23 a ton to make foundry iron. After many weeks of inactivity in basic iron, prospects for business appear more encouraging. One sale of 1000 tons has been made and a Harrisburg steel plant is in the market for 3000 tons or more. Two other steel companies are expected to need iron shortly. Since the last sale, which was at $19, furnace, the views of sellers have changed, and it appears unlikely that basic iron could now be bought below $19.50 to $20, furnace. The inquiry for foundry iron continues fairly good. A radiator company which buys in New York is inquiring for 3000 tons for second quarter and a plumbing goods manufacturer at Trenton, N. J., wants 1500 tons for delivery beginning May 15. Another inquiry of a confidential character calls for 2000 tons. There are numerous small inquiries forming a substantial aggregate.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to $1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$20.76 to $20.84
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.26 to 21.34
Virginia No. 2 plain, 1.75 to 2.25 sil.	26.24 to 26.74
Virginia No. 2X, 2.25 to 2.75 sil.	27.24 to 27.74
Basic delivery eastern Pa.	20.50 to 21.00
Gray forge	20.50 to 21.00
Malleable	22.50 to 24.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Ferroalloys.—There is no change in the ferromanganese situation except that increased activity at steel plants has resulted in a slightly better demand, but orders are confined to small lots. Domestic and imported alloy are quoted uniformly at $62.50, Atlantic seaboard.

Rails.—The Chesapeake & Ohio Railroad distribution of rails for 1922 delivery has been announced as follows: Inland Steel Co., 9000 tons; Illinois Steel Co., 7000 tons; Bethlehem Steel Co., 1000 tons. For its subsidiary road, the Hocking Valley, the Chesapeake & Ohio placed 3000 tons with the Lackawanna Steel Co. The Cambria works at Johnstown, Pa., will roll 5000 tons of 16-lb. rails for shipment to Japan. Inquiries for lots of 500 to 1000 tons of rails from street railroad companies have been received within the past week.

Semi-Finished Steel.—Open hearth rerolling billets at $28 and forging billets at $32, Pittsburgh, are still obtainable, though small lots are sometimes sold $1 a ton higher. Sheet bars have been sold for shipment to an Eastern mill at $29, Youngstown.

Plates.—Eastern mills are quoting uniformly on the basis of 1.50c., Pittsburgh, for sheared and universal plates, and the only quotations below that figure appear to come from the leading interest, which quotes 1.40c. to its regular trade. While much of the business closed within the past week has brought only about 1.35c., Pittsburgh, sales have been made only where protection had been given prior to the recent advance. Orders for small lots have been booked at 1.50c., but in no case has the quantity exceeded 200 tons, so far as reported. Bids on 2000 to 4000 70-ton steel freight cars for the Norfolk & Western Railroad will be opened this week. More locomotive work is in prospect. The Baltimore & Ohio and the Southern Railway are reported to be inquiring for a few engines each. We quote plates at 1.40c. to 1.50c. base, Pittsburgh.

Structural Material.—Small orders for plain material have been booked at 1.50c., Pittsburgh, by independent mills, but shapes are still obtainable at 1.40c. A good deal of structural work is being figured on. Two apartment houses will require about 1000 to 1200 tons each. A new terminal and ferry slips for the Philadelphia & Reading Railroad at Camden, costing $2,500,000, will require considerable steel, though actual tonnages have not been specified. Port development work at Norfolk, Va., including piers and a grain elevator, will also bring steel inquiries into the market shortly. The American Bridge Co. was low bidder on the first section of the new Public Ledger Building, requiring 1200 tons. We quote plain material at 1.40c. to 1.50c., Pittsburgh.

Old Material.—The Bethlehem Steel Co. is buying steel scrap, paying $13.50 delivered Bethlehem and $14 at Steelton. The Cambria Steel Co., which has been a consistent buyer for two or three weeks, paying up to $14.25 delivered for steel scrap, dropped out of the market late last week, causing a momentary sagging in prices, but the demands of the Bethlehem Steel Co. this week brought increased strength. Turnings are in demand and scarce. We quote for delivery at consuming points in this district as follows:

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	$13.50 to $14.00
Scrap rails	13.50 to 14.00
Steel rails, rerolling	15.00 to 15.50
No. 1 low phos., heavy 0.04 and under	18.00 to 19.00
Cast iron car wheels	16.00 to 16.50
No. 1 railroad wrought	15.50 to 16.00
No. 1 yard wrought	13.50 to 14.00
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	10.00 to 10.50
No. 1 busheling	12.50 to 13.50
No. 2 busheling	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use)	11.00 to 11.25
Mixed borings and turnings (for blast furnace use)	11.00 to 11.25
Machine-shop turnings (for rolling mill and steel works use)	12.00 to 12.50
Heavy axle turnings (or equivalent)	12.00 to 12.50
Cast borings (for steel works and rolling mills)	12.00 to 12.50
Cast borings (for chemical plants)	15.00 to 16.00
No. 1 cast	17.25 to 17.75
Railroad grate bars	14.50 to 15.00
Stove plate (for steel plant use)	14.00 to 14.50
Railroad malleable	13.00 to 13.50
Wrought iron and soft steel pipes and tubes (new specifications)	13.00 to 13.50
Shafting	18.00 to 19.00

New York

NEW YORK, March 21.

Pig Iron.—The purchase of 5000 tons by a cast iron pipe interest, referred to in these columns last week, has been confirmed and other sales foot up from 5000 to 6000 tons, mostly foundry grades for early delivery, but including one lot of 500 tons of malleable, which was sold at $18, Buffalo. Pending inquiries include one from Trenton, N. J., for 1500 tons, delivery over three months beginning May 15, equally divided among No. 1, No. 2X and No. 2 plain. Several other inquiries ranging from 1000 to 2000 tons are pending, but nearly all the new orders and inquiries are for small tonnages. Buyers are showing more interest and the general condition in the market is more satisfactory than it has been recently.

We quote delivered in the New York district as follows, having added to furnace prices $2.52 freight from eastern Pennsylvania, $5.46 from Buffalo and $6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	$22.52 to $23.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	22.02 to 22.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	21.52 to 22.02
Buffalo, sil. 1.75 to 2.25	23.46 to 23.71
No. 2 Virginia, sil. 1.75 to 2.25	28.16

Ferroalloys.—The market for ferromanganese is moderately active and sales of from 1500 to 2000 tons are reported to have been made with all selling agencies participating. There are still fair quantities before the market which have not been placed and there is more interest than in some weeks. In the spiegeleisen market there have been sales of carload lots at prevailing prices and there have appeared tentative inquiries for large amounts which have not yet developed into orders. In manganese ore there is a little more inquiry, but no business is reported and quotations are nominally unchanged. The 50 per cent ferrosilicon market is fairly active, due largely to the increased production of steel, and a fair business has been done both for early delivery and on contract at prevailing quotations. There is also more interest in ferrochromium and moderate sales have been made. Quotations follow:

Ferroalloys

Ferromanganese, domestic, seaboard, per ton	$62.50
Ferromanganese, British, seaboard, per ton	$62.50
Spiegeleisen, 16 to 19 per cent, furnace, per ton	$29.00
Spiegeleisen, 20 per cent, furnace, per ton	$30.00
Ferrosilicon, 50 per cent, delivered, per ton	$55.00 to $60.00
Ferrotungsten, per lb. of contained metal	40c. to 50c.
Ferrochromium, domestic, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb Cr., delivered	13c. to 14c.
Ferrovanadium, per lb. of contained vanadium	$4.00

Ores

Manganese ore, foreign, per unit, seaboard	25c. to 26c.
Tungsten ore, per unit, in 60 per cent concentrates	$2.00 up
Chrome ore, 40 to 45 per cent Cr_2O_3, crude, per net ton, Atlantic seaboard	$18.00 to $20.00
Chrome ore, 45 to 50 per cent Cr_2O_3, crude, per net ton, Atlantic seaboard	$19.00 to $21.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York	45c.

Finished Iron and Steel.—Fresh developments in the local steel market have been few since independent steel company advances took their prices on plates, shapes and bars to 1.50c., Pittsburgh. So far as can be learned practically all of them are adhering to this quotation, but the leading interest is said still to be accepting orders for the heavy products at 1.40c., Pittsburgh. Most of the business closed within the past week has been at prices ranging from 1.35c. to 1.40c., Pittsburgh, the lower price having been accepted where protection had been given prior to the advance. Small orders are being booked at 1.50c., but nothing larger than a carload is reported at this figure. Some companies which are quoting 1.50c. on soft steel bars will accept 1.40c. on bars for concrete reinforcing. Export prices are slightly firmer, but are not within several dollars a ton of the minimum domestic prices. Plates, shapes and bars have been sold for export within the week at 1.35c., Pittsburgh, or less. In competition with foreign mills, it is stated that it is necessary for American mills to go as low as 1.30c., Pittsburgh, on some business to be in the running. Low prices are still heard on tin plate, both for domestic and export trade. The domestic price is nominally $4.60 per 100 lb. base box, Pittsburgh, but occasional reports of a $4.50 price are still heard. Wire products and sheets continue fairly firm. In view of the present price situation interest attaches to the public opening of bids on 3000 tons of bars, shapes and plates and additional lots of track supplies by the New York Central Railroad on Wednesday of this week. The Newport News Dry Dock & Shipbuilding Co. is reported to have placed 700 tons of plates and a few hundred tons of shapes through its New York office for the reconditioning of the steamship Leviathan. A current export inquiry is for 22,000 boxes of tin plate for the Nippon Oil Co. of Japan. Welsh mills, it is stated here, are able to undersell American mills on a c. i. f. basis if the recent advance in the export tin plate price is maintained, and it becomes a question whether buyers in the Far East are willing to pay a slight premium for American plate. The Sinclair Consolidated Oil Corporation has placed 12 oil tanks, requiring 3100 tons of steel, with the Graver Corporation, Chicago. This lot is an addition to the 10 bought from the Chicago Bridge & Iron Works, reported two weeks ago. Structural projects continue in fairly good volume. Some of the new inquiries follow:

Lehigh Valley Railroad, 400 tons, for eight bridges.

Building for the Talbot Mills, Billerica, Mass., 800 tons.

Store for the Edward Malley Co., New Haven, Conn., 750 tons.

Bridge for the Seaboard Air Line, 250 tons.

Buildings for the Mount Hope Finishing Co., North Dighton, Mass., 300 tons.

Department store at Scranton, Pa., 1000 tons.

Chemistry laboratory for Tufts College, Somerville, Mass., 500 tons.

Municipal gas plant at Albany, N. Y., 900 tons.

Jobs which have been awarded include the following:

Apartment house in Philadelphia, 1900 tons, to American Bridge Co.

Home Insurance Building, New York, 750 tons, to Hedden Iron Construction Co.

Bridges and repair work for Delaware, Lackawanna & Western Railroad, 1800 tons, to American Bridge Co.

Building for the Abbott Worsted Co., Forge Village, Mass., 200 tons, to American Bridge Co.

Twelve story loft, Madison Avenue and Forty-eighth Street, 4300 tons, to Post & McCord.

Piershed for Lehigh Valley Railroad, Greenville, N. J., 1800 tons, reported let to Bethlehem Steel Bridge Corporation.

Knights of Columbus building at Bayonne, N. J., 200 tons, to Fagan Iron Works.

Building for Conley Tin Foil Co. at Glendale, Long Island, 400 tons, to McClintic-Marshall Co.

Cane sugar plant at Miami, Fla., 700 tons, to McClintic-Marshall Co.

Chamber of Commerce building, Newark, 1700 tons, to Hay Foundry & Iron Works.

Loft building on Seventh Avenue, New York, 500 tons, to A. E. Norton Co.

Temple University building, Philadelphia, 400 tons, to American Bridge Co.

Sumner Building, Boston, 800 tons, to New England Structural Co.

Warehouse, Boston, 3500 tons, to McClintic-Marshall Co.

Directors of the New York Central Railroad met last week and adjourned without a decision being announced regarding the letting of the proposed bridge at Castleton, N. Y., across the Hudson River. The Chesapeake & Ohio is in the market for 63 passenger and express cars.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.78c.; plates, 1.78c.; structural shapes, 1.78c. to 1.88c.; bar iron, 1.73c. to 1.88c. On export shipments the freight rate is 28.5c. per 100 lb. and the domestic rate is 38c.

Cast-Iron Pipe.—The tone of the market is extremely optimistic. Buying by private water and gas companies continues large and municipal tenders appear from time to time. The Department of Water Supply, Gas and Electricity, New York, closed March 22 on a contract which involves about 1100 tons of cast iron pipe, ranging through a number of sizes from 8 in. to 32 in. One cast-iron pipe manufacturer reports 85 per cent operation and more pits going than prior to the war. We quote per net ton, f.o.b. New York, as follows: 6-in. and larger, $47.30; 4-in. and 5-in., $52.30; 3-in., $62.30, with $4 additional for Class A and gas pipe.

Warehouse Business.—Although lower prices prevail in other markets, warehouses in this district have not announced any change in quotations. Current

prices are weak, however, and there is a distinct tendency to shade them whenever good business presents itself. Structural material is fairly active and there is some sheet buying. Brass and copper warehouses report activity and a general stiffening in prices. No change in the situation among dealers in wrought iron and steel pipe is reported. We quote prices on page 846.

High-Speed Steel.—The market is unchanged at about 75c. to 85c. per lb. for 18 per cent tungsten high-speed steel, with special brands of some companies still quoted up to as high as $1.05 per lb.

Coke.—The market continues fairly active. Prices on beehive grades range from $4.50 to $4.75 with $4.50 more frequently prevailing. It is becoming more difficult to obtain prompt delivery, but there is no excitement about the expected strike of coal miners. By-product coke is still quoted at $8.59, delivered to points on the Pennsylvania, Erie and Lackawanna railroads, and $9.15 to points on the Central of New Jersey.

Old Material.—The upward trend in the market continues. No. 1 heavy melting steel is firm at $9 to $9.50 per ton, buying price New York, although it is reported that $16.25 per ton has been done on sales in the Pittsburgh district. Some brokers in this market claim to be willing to offer up to $10 per ton for heavy melting steel. Wrought iron track shows an advance this week of $1 per ton, now being quotable at $9.50 to $10. Iron and steel pipe, not under 2 ft. long is also 50c. per ton higher, bringing from $8.25 to $8.75 per ton. A fair quotation on mixed borings and turnings is $6 to $6.50 per ton.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard	$9.00 to $9.50
Steel rails, short lengths, or equivalent	9.50 to 10.00
Rerolling rails	9.25 to 9.75
Relaying rails, nominal	27.00 to 28.00
Steel car axles	10.00 to 10.50
Iron car axles	17.50 to 18.50
No. 1 railroad wrought	9.50 to 10.00
Wrought iron track	9.50 to 10.00
Forge fire	5.50 to 6.00
No. 1 yard wrought, long	9.50 to 10.00
Cast borings (clean)	7.00 to 7.50
Machine-shop turnings	5.75 to 6.25
Mixed borings and turnings	6.00 to 6.50
Iron and steel pipe (1 in. diam., not under 2 ft. long)	8.25 to 8.75
Stove plate	10.50 to 11.00
Locomotive grate bars	10.00 to 10.50
Malleable cast (railroad)	8.50 to 9.00
Cast-iron car wheels	10.50 to 11.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	$17.00 to $17.50
No. 1 heavy cast (columns, building materials, etc.), cupola size	16.00 to 16.50
No. 1 heavy cast, not cupola size	15.00 to 15.50
No. 2 cast (radiators, cast boilers, etc.)	10.50 to 11.00

Cleveland

CLEVELAND, March 21.

Iron Ore.—While some consumers are showing an interest in iron ore prices for this year, ore shippers do not expect that the season's prices will be named before May 1. Ore men look for a little demand for small lots of ore for shipment when the season of navigation opens, but it is probable that such sales will be made subject to whatever prices are named later. The general improvement in the iron and steel industry is encouraging to ore shippers. Taking into consideration the large stocks of ore on hand at docks and in furnace yards, the season's movement is not expected to exceed 35,000,000 tons. No developments have occurred locally in the freight rate situation since the railroads notified the shippers that a 20 per cent reduction on rates from Lake Erie ports to interior furnaces would be placed in effect April 17. Shippers feel confident that the Interstate Commerce Commission will refuse the request of Buffalo interests that a proposed rate be suspended. The announcement of a reduction in rail rates has had no effect on dock shipments, as very little ore is moving from docks, furnaces taking only what ore they are actually in need of.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, $6.45; Old range non-Bessemer, 51½ per cent iron, $5.70; Mesabi Bessemer, 55 per cent iron, $6.20; Mesabi non-Bessemer, 51½ per cent iron, $5.55.

Pig Iron.—Sales of foundry iron show an increase, but there are weak spots in the market which have resulted in some price concessions, although most sellers are adhering to recent quotations. A local producer has taken some foundry iron at $18.50 for Cleveland delivery and this price is evidently being shaded about 50c. a ton for shipment to some points. One sale of 1000 tons is reported at $18.50 for delivery to a nearby point. A local producer is quoting foundry iron on the basis of $19, Valley furnace, for shipment to points where the Valley has the freight advantage. Several lots have been sold for shipment from Cleveland to the Pittsburgh district, but it is stated that on this business the Cleveland producer did not absorb all the freight differential, which would have brought the price down to approximately $18 a furnace. Sales during the week included several 1000 ton lots to Ohio consumers. A Cleveland foundry purchased 1000 tons and several 500-ton lot sales were made to local consumers. One lake furnace reports sales aggregating 8000 tons during the week, mostly at $19. These include 1000 tons of foundry iron taken by a Michigan manufacturer of motor castings, 600 tons of malleable iron by an Indiana foundry and 400 tons of malleable by an Ohio foundry. While the bulk of the sales are for early shipment, some contracts have been placed for the second quarter. Only one or two inquiries have developed for more extended deliveries and buyers and sellers generally are not disposed to enter into contracts for delivery beyond July 1. Sales and shipments show a marked gain over February. One interest operating four of eight furnaces is now shipping more iron than it is making. The demand for low phosphorus iron in small lots has improved but prices are easier.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a $1.96 freight rate from Valley points, a $3.36 rate from Jackson and a $6.67 rate from Birmingham:

Basic	$19.96
Northern No. 2 fdy., sil. 1.75 to 2.25	$18.50 to 19.50
Southern fdy., sil. 1.75 to 2.25	22.17
Ohio silvery, sil. 8 per cent	30.86
Standard low phos., Valley furnace	30.00 to 31.00

Finished Material.—The stimulaing effect on buying that was caused by the stiffening of prices continued during the week. Mills booked a good volume of business from jobbers, bolt and nut manufacturers, automobile manufacturers and other consumers. Orders came from manufacturers of automobile springs for 700 tons of spring steel. Orders show that buyers are not being stampeded by the possibility of higher prices into placing large tonnages for stock, but are buying rather conservatively. While a few sales are reported at the 1.50c. price, 1.40c. is still the going market price and the bulk of the business was taken at that price. Independent mills before they advanced prices gave protection to many of their customers at the old price and considerable of the business placed during the week was the closing of the contracts covered by these protections. However, some inquiries came out from consumers who had not secured protection. The leading interest which is still quoting steel bars, plates and structural material at 1.40c. for current orders have taken some contracts at 1.50c., but will make shipments against these contracts at 1.40c. as long as that remains its market price. With these contracts it will not have lower priced steel on its books, should it decide to mark its prices up. Reeves Brothers, Alliance, Ohio, have taken oil tanks for the Magnolia Petroleum Co. requiring 1300 tons of plates which have been placed with a Johnstown, Pa., mill, which has also taken 500 tons of structural material for the Kresge Building, Cleveland. In structural lines, the Detroit Medical Building, Detroit, requiring 1260 tons, has been placed with the Russell Wheel & Foundry Co., Detroit, and the East High School, Columbus, Ohio, requiring 200 tons, has been taken by the Massillon Bridge & Structural Co. Bids have been taken for the Genessee Building, Buffalo, requiring 2800 tons and for a bank at Brownsville, Pa., requiring 500 tons, and an inquiry is out for a Physics Building for the University of Michigan requiring 200 tons.

Hoops and Bands.—The demand for hoops and bands has become more active, but prices are irregular.

Quotations of 1.85c. for hoops and 1.75c. for bands are appearing, but one Valley mill is now asking 2c. for hoops and 1.85c. for bands.

Sheets.—The demand for sheets continues fair. While prices are generally firm, there are reports of shading on galvanized sheets. Weakness is also reported in warehouse prices on galvanized sheets, quotations of 4.25c. appearing or about the present delivered cost to the jobbers. This $10 a ton concession is evidently being made to reduce stock.

Warehouse Business.—Cleveland warehouses have reduced prices $3 per ton on steel bars, plates and structural material and on hoops and bands and $5 a ton on cold-rolled steel. These reductions are due to competition in the Central Western territory and to the naming of lower warehouse prices in Chicago and Detroit. Warehouse orders show some gain.

Jobbers quote steel bars, 2.21c.; plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3c.; No. 9 annealed wire, 2.50c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.06c. to 3.10c.; hoops and bands, 2.56c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

High Speed Steel.—German made high speed tool steel is being offered in this market at 55c. to 58c. per pound for steel running about 14 per cent tungsten, but no sales of the imported steel are reported. The market continues very irregular. Prices on domestic 18 per cent tungsten high speed steel range from 65c. to 80c. per lb. with some of the leading manufacturers holding to a minimum price of 70c.

Bolts, Nuts and Rivets.—The improvement in the demand for bolts and nuts continues and some makers report that they booked more business during the first half of March than during all of February. One maker has taken some contracts for the second quarter, but manufacturers are not inclined to get loaded up with orders for that delivery at current prices. Regular discounts appear to be holding better than they have recently. Rivet sales have improved. Prices are steady at 2.10c. for structural and 2.20c. for boiler rivets, but there are occasional reports of shading of these prices.

Old Material.—Prices on many grades have advanced and the market is firm. There was very little buying by the mills during the week, the only local activity on the part of a consumer being the purchase of a few lots of machine shop turnings. Heavy melting steel is quoted at $15.50 to $16 for Valley delivery. Dealers have forced prices up on this grade to a higher point than mills are willing to pay. For Valley shipment dealers are offering up to $15.75 for heavy melting steel, $13 for compressed steel, $12 for borings and turnings and $12.50 for flashings. For delivery to a Cleveland consumer they are offering $13.50 for heavy melting steel and $10 for turnings.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	$13.00 to $13.25
Steel rails, under 3 ft	13.25 to 13.75
Steel rails, rerolling	15.00 to 16.00
Iron rails	13.00 to 14.00
Iron car axles	18.00 to 19.00
Low phosphorus melting	14.00 to 14.25
Cast borings	9.50 to 9.75
Machine shop turnings	9.50 to 9.60
Mixed borings and short turnings	9.50 to 9.60
Compressed steel	10.25 to 10.50
Railroad wrought	13.00 to 13.75
Railroad malleable	13.00 to 13.50
Light bundled sheet stampings	8.50 to 9.00
Steel axle turnings	11.00 to 11.50
No. 1 cast	15.00 to 16.00
No. 1 busheling	9.50 to 9.75
Drop forge flashings, over 10 in	10.25 to 10.75
Drop forge flashings, under 10 in	10.50 to 11.00
Railroad grate bars	13.00 to 13.25
Stove plate	13.25 to 13.50
Pipes and flues	10.00 to 11.00

Ore Rate Hearing Resumed

The hearing on upper lake ore rates which was adjourned some two or three months ago was resumed at the Great Northern Hotel, Chicago, on March 21, with Examiner Howard Hosmer of the Interstate Commerce Commission presiding. The morning session was taken up with rebuttal by Robert Hula, Steel & Tube Co. of America, and representatives of the Midvale Steel & Ordnance Co. and M. A. Hanna & Co., of exhibits entered in the previous hearing by the Chicago & Northwestern.

Cincinnati

CINCINNATI, March 21.

Pig Iron.—The market was fairly active during the week, most of the sales being, however, for small tonnages for immediately delivery. The largest sale reported was one of 6000 tons of Southern iron taken by a sanitary ware manufacturer. This interest is expected to close on another 3000 tons during the week, the whole tonnage being for delivery during the second quarter. A Columbus melter bought 300 tons of Northern iron, and a nearby melter 200 tons. Several sales of Southern iron are also reported, one being for 200 tons. A number of fair-sized inquiries are current. The Rundle Mfg. Co. is inquiring for 2500 tons of Southern iron, and the Ross-Meehan Co. has not closed on its inquiry for 1000 tons of malleable. The Westinghouse company is inquiring for 3000 tons of foundry iron, and a Michigan melter is in the market for 400 tons of Bessemer. Several other inquiries for 100-ton lots are also current. Prices show no change, although reports are current that Southern irons are inclined to advance. A very encouraging feature of the market is seen in the report of the Ohio State Foundrymen's Association for the month of February. The melt showed 50 per cent increase over January, having jumped from 22 to 33 per cent of normal.

Based on freight rates of $4.50 from Birmingham and $2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	$19.50 to $20.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	20.00 to 20.50
Ohio silvery, 8 per cent sil	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	21.02 to 21.52
Basic, Northern	21.02
Malleable	21.52 to 22.02

Finished Material.—The effect of the recent advance in prices made by practically all of the independent mills can hardly be gaged as yet. The immediate result of the advances, however, was to bring in a fair amount of business that had been quoted on, but during the past week the number of orders booked was rather light, the buyers, no doubt, hesitating to commit themselves until the price situation becomes more clear. A number of carload orders were placed at the advanced prices, but on the whole business during the week was light. An inquiry for 800 tons of reinforcing bars is the largest one reported and it is said that some hesitancy is being shown by mills in quoting on this business, as the delivery extends over the next few months. Prospects of a coal strike, with possible interruption to mill operations, is also being taken into account by mills when booking business and there appears to be a hesitancy on their part to quote for extended deliveries. The sheet market during the week was reported to be fairly active, but tin plate manufacturers, while booking some fair-sized orders, state that the market may well be regarded as spotty. Most of the orders placed are for immediate delivery, and there is not much tendency on the part of buyers to book as far ahead as is generally the case at this season of the year. In wire products, business has been fairly good, one order calling for 3000 kegs of nails. An inquiry for 800 kegs during the week, which it was thought would bring out a lower price than $2.40 Pittsburgh, is reported to have been placed on this basis. One of the most encouraging features in the local situation was the appearance of several carload orders for cold-rolled steel. The city of Dayton, Ohio, has purchased 200 tons of cast iron pipe and fittings, the order going to the United States Cast Iron Pipe & Foundry Co. The only award of consequence in the structural field was one of 500 tons of bridge work made by the Nashville, Chattanooga & St. Louis Railway to the American Bridge Co. Bids will close on March 27 for the 22-story Snowden building at Memphis, Tenn. On the same date bids will close for the new dormitory building at the University of Cincinnati. Estimates will be received until March 29 for a five-story office building for the First National Bank at Richmond, Ind. Bids are also being taken on section 6 of the rapid transit loop in Cincinnati. This section is to cost approximately $400,000 and a fair tonnage of reinforcing bars will be required. Plans have been

approved for two new school buldings in Cincinnati involving an expenditure of $650,000 and a new high school for Evansville, Ind., will likely be up shortly. The city of Cincinnati will start at once preparing plans for the new Eighth Street viaduct, which will cost approximately $1,500,000.

Plant Operations.—The American Rolling Mill Co. will continue to operate both plants at Middletown to capacity and it is expected that three sheet mills at the Ashland plant will be in operation toward the end of the week. This company is now operating 35 of its 50 sheet mills. The Andrews Steel Co. at Newport, Ky., will commence making steel this week, three open-hearth furnaces being on. The Newport Rolling Mill Co. will put on two additional sheet mills, giving it a total of 10, and it is expected that a slightly increased operation at the plant of the Whitaker-Glessner Co. at Portsmouth will also be made.

Warehouse Business.—Local jobbers report a considerable improvement during the week. Structural steel and reinforcing bars continue to be active, and there is also a slight increase noted in the demand for wire products. Prices are firm and unchanged.

Iron and steel bars, 2.75c. base; hoops and bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82½c. base; cold rolled rounds, 1½ in. and larger, 3.50c. base; under 1½ in. and flats, squares and hexagons, 4c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, $2.75 per keg base; No. 9 annealed wire, $2.60 per 100 lb.

Coke.—The coke market still shows fair activity, and some contracting is still going on for the year's requirements. Connellsville furnace coke is quoted at $3.50, and foundry at $4.50 to $5. Quotations from New River and Wise County districts are unchanged.

Old Material.—The local scrap market continues inactive, but Western markets are showing more life. Inquiries from the smaller centers for special grades are also increasing in number, and altogether the tone of the market is much improved. It is reported that a steel company operating in the Cincinnati district had closed for 10,000 tons of scrap. The report in this paragraph several weeks ago indicated that the purchase was much smaller. Prices are unchanged, but firm.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton	
Bundled sheets	$4.50 to $5.00
Iron rails	11.50 to 12.00
Relaying rails, 50 lb. and up	24.50 to 25.00
Rerolling steel rails	10.00 to 10.50
Heavy melting steel	9.50 to 10.00
Steel rails for melting	9.50 to 10.00
Car wheels	12.00 to 12.50
Per Net Ton	
No. 1 railroad wrought	9.00 to 9.50
Cast borings	4.00 to 4.50
Steel turnings	3.00 to 3.50
Railroad cast	12.00 to 12.50
No. 1 machinery	14.00 to 14.50
Burnt scrap	7.50 to 8.00
Iron axles	16.00 to 16.50
Locomotive tires (smooth inside)	9.00 to 9.50
Pipes and flues	3.50 to 4.00

Boston

BOSTON, March 21.

Pig Iron.—Although individual orders in most cases are small, a more diversified buying movement of pig iron is reported this week than noted before in months. Sales aggregate 6500 tons, largely Buffalo iron, and include 1000 tons of silicon 2.75 to 3.25 to a Massachusetts maker of textile machinery, and another 1000 tons made up of three different grades from two furnaces to another Massachusetts textile interest. Both melters recently purchased round tonnages. Other sales range in size from car lots to 500 tons, practically all of them for second quarter delivery. As far as known, no furnace is quoting for delivery beyond July. Practically no No. 2 plain iron is selling. Sales of Buffalo iron this week are reported at $18 for No. 2X and No. 1X, and in some instances at $18.25 for No. 1X, but $17.75 furnace was done by one Worcester, Mass., machinery maker. Eastern Pennsylvania is still available at $19 furnace, although most furnaces are on a $20 furnace base and asking differentials. One eastern Pennsylvania furnace this week made a few sales of No. 2X at $20 furnace. A few sales of Alabama iron for mixture purposes are reported in this territory at delivered prices $3 to $4 above Northern irons. The inactivity of Virginia furnaces eliminates such irons from this market. Small sales of charcoal iron were made this week at $22.50 furnace.

We quote delivered at common New England points as follows, having added to furnace prices $4.06 freight from eastern Pennsylvania, $5.46 from Buffalo, $6.58 from Virginia and $10.66 from Alabama:

East. Penn., sil. 2.25 to 2.75	$23.06 to $24.56
East. Penn., sil. 1.75 to 2.25	23.06 to 24.06
Buffalo, sil. 2.25 to 2.75	23.46 to 23.96
Buffalo, sil. 1.75 to 2.25	23.46 to 23.96
Virginia, sil. 2.25 to 2.75	29.58
Virginia, sil. 1.75 to 2.25	29.08
Alabama, sil. 2.25 to 2.75	26.16 to 26.66
Alabama, sil. 1.75 to 2.25	25.66 to 26.16

Cast Iron Pipe.—The city of Boston has awarded 1850 tons, 6 to 36-in. pipe, to the United States Cast Iron Pipe & Foundry Co., and the town of Wellesley, Mass., 210 tons, 6, 8 and 10-in. pipe to the Warren Foundry & Machine Co. These two sales represent the largest placed in this territory during the past 10 days. Business otherwise has been confined largely to car lots. Prospects for future business are bright, especially from municipal sources, but amounts on which bids will be asked are rather indefinite at this time. Prices on cast iron pipe are reported as strong, but unchanged, as follows: Per net ton, f.o.b. Boston and district, in car load lots, 3-in., $66.70; 4-in., $56.70; 6-in., $50.70; 10-in. and larger, $49.70, with $4 differentials on class A and gas pipe.

Coke.—The movement of by-product foundry coke from New England ovens to foundries continues heavy, but the force of incoming business apparently has spent itself, a majority of melters having sufficient fuel on hand to meet their requirements for some time. The leading coke producer in this territory, the New England Coal & Coke Co. has an adequate reserve stock of bituminous to supply its needs for some weeks after April 1. The by-product coke market is firm on a basis of $10.15 delivered where the local freight does not exceed $3.40.

Old Material.—The local market is sentimentally firmer, although quiet. Dealers in this territory say the outlook for Pittsburgh district mill buying within the near future is encouraging. Some speculation among dealers in anticipation of mill buying is noted, but such business is restricted by a lack of material. Heavy melting steel and wrought pipe quotations made here this week show a slight advance. Turnings and mixed borings and turnings are in demand and 50c. to 75c. higher. Ordinary cast iron borings, on the other hand, are about $1 lower due to the withdrawal of Massachusetts buyers from the market. Chemical borings continue in demand at previously quoted prices. Small sales of railroad malleable at $14 delivered Massachusetts are reported. Business in machinery cast is confined to an occasional car-lot at around $17.50 delivered.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery	$17.00 to $17.50
No. 2 machinery	15.00 to 15.50
Stove plate	14.50 to 15.00
Railroad malleable	13.00 to 13.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$9.00 to $9.50
No. 1 railroad wrought	10.50 to 11.00
No. 1 yard wrought	9.50 to 10.00
Wrought pipe (1 in. in diam., over 2 ft. long)	7.25 to 7.75
Machine shop turnings	5.50 to 6.00
Cast iron borings, rolling mill	7.50 to 8.00
Cast iron borings, chemical	9.00 to 9.50
Blast furnace borings and turnings	5.50 to 6.00
Forged scrap and bundled skeleton	4.50 to 5.00
Street car axles	11.50 to 12.00
Shafting	12.00 to 13.00
Car wheels	11.00 to 11.50
Rerolling rails	9.50 to 10.00

Basing Point Hearing at Chicago

A Chicago hearing on the Pittsburgh basing point practice was opened before the Federal Trade Commission on March 20. Among the witnesses who appeared on the first day were George E. Lasker, Lasker Iron Works, Chicago; Eugene H. Heller, president Hill Pump Valve Co., Chicago, and H. E. White, traffic expert, Western Association of Rolled Steel Consumers.

St. Louis

ST. LOUIS, March 21.

Pig Iron.—The principal sale of the week was that of 2500 tons of low phosphorus, off in sulphur iron, made by a local producer to a St. Louis melter. The situation continues steadily to improve, the demand being better and purchasers being eager to get deliveries of orders placed. The stove foundries report that salesmen are sending in a greater volume of business than was expected, and one plant here placed a repeat order for 300 tons of Southern iron. Local job foundries also report an increasing volume of business. A Southern maker reports that more interest is being shown in the water and rail price from Sheffield, equal to $19.44, St. Louis, made several weeks ago, and several 300-ton orders were placed during the week, in addition to a number of smaller requirements. Other Southern makers are quoting $15 to $15.50, but the Sheffield concern is believed to be getting the bulk of the business because of the lower rate. The market for Northern iron is firm at $20, Chicago, with the local makers meeting that figure. A Quincy, Ill., stove manufacturer is in the market for 1000 tons for second quarter delivery. A Missouri melter wants 350 tons over six months' delivery. Negotiations are on with a southern Illinois melter for 500 tons, and a Kansas melter wants from 300 to 500 tons.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices $2.80 freight from Chicago and $5.74 from Birmingham:

Northern foundry, sil. 1.75 to 2.25	$22.80
Northern malleable, sil. 1.75 to 2.25	22.80
Basic	22.80
Southern foundry, all rail, sil. 1.75 to 2.25	$20.74 to 21.24
Southern foundry, water and rail, sil. 1.75 to 2.25, f.o.b. St. Louis	19.44

Finished Iron and Steel.—The center of interest in these lines lies with the railroads. The Missouri Pacific Railroad, which is the heaviest purchaser of material of any of the railroads centering here, is in the market for 500,000 tie plates; the Mobile & Ohio wants 20,000 tie plates; the Wabash has an inquiry out for 500 tons of tie plates, and the Terminal Railway wants 40 to 50 tons of angle bars. The Missouri, Kansas & Texas Railway's requirements of 200,000 tie plates went to the Railway Supply Co. The work of double tracking and grade revision to be done by the St. Louis & San Francisco, already announced in THE IRON AGE, will begin April 1. A total of 21½ miles will be double tracked. The requirements for 90-lb. rails and all track fastenings will be handled by the United States Steel Corporation under a contract of several years' standing and which has several years to run. The Missouri, Kansas & Texas is in the market for 30 72½-feet passenger coaches. The St. Louis Car Co. got the contract for 50 steel electric passenger cars from the Southern Pacific Railway of San Francisco, the contract for the motors going to the Westinghouse Manufacturing Co., Pittsburgh. The estimated cost of the cars is $800,000. The biggest sale of structural steel of the week was that of 600 tons to the Stupp Brothers Bridge & Iron Co. by the Jones & Laughlin Steel Co. for all-barge shipment. An arrangement made with an Eastern fabricator for the purchase of 450 tons of structural steel for the Majestic Theater and Office Building, Dallas, has been cancelled and bids are to be asked on this as well as for 100 tons of bars.

For stock out of warehouse we quote: Soft steel bars, 2.37½c. per lb.; iron bars, 2.37½c.; structural shapes, 2.47½c.; tank plates, 2.47½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.15c.; cold drawn rounds, shafting and screw stock, 3.50c.; structural rivets, $3.09½ per 100 lb.; boiler rivets, $3.19¼; tank rivets, 7/16-in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-5 per cent; hot pressed nuts, square or hexagon blank, $4; and tapped, $3.75 off list.

Coke.—The coke market is improving right along, a condition applying to all grades. Buying is heavier, and there is an insistent demand by purchasers for immediate shipment. The market has advanced, and some Connellsville producers are quoting from $4.75 to $5.25.

Old Material.—The market maintains a fairly firm undertone, although some dealers appear to be weakening, because of fear they have carried the market too far, as consumers refuse to pay by about $1 a ton the prices paid by the dealers on railroad lists recently closed. There appears to be a heavy short interest among the dealers, as some of them are eager to cover the bought material which they can only dispose of at a loss. The larger consumers contend they are paying the limit and cannot make steel at a profit by buying old material at the advances asked by dealers, as they must either use the cheaper grades or remain out of the market until the present flurry has subsided. Relaying rails are active, and several large inquiries are out for the heavier sections. Light section relayers, however, are not in demand.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Old iron rails	$14.00 to $14.50
Steel rails, rerolling	12.50 to 13.00
Steel rails, less than 3 ft	12.50 to 13.00
Relaying rails, standard section	23.00 to 28.00
Cast iron car wheels	15.00 to 15.50
No. 1 heavy railroad melting steel	10.50 to 11.00
No. 1 heavy shoveling steel	10.00 to 10.50
Ordinary shoveling steel	10.00 to 10.50
Frogs, switches and guards, cut apart	10.50 to 11.00
Ordinary bundle sheet	4.50 to 5.00
Cast steel bolsters	11.00 to 11.50
Per Net Ton	
Heavy axle and tire turnings	6.50 to 7.00
Iron angle bars	13.00 to 13.50
Steel angle bars	11.00 to 11.50
Iron car axles	18.00 to 18.50
Steel car axles	13.00 to 13.50
Wrought iron arch bars and transoms	15.50 to 16.00
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	9.00 to 9.50
Railroad springs	12.00 to 12.50
Steel couplers and knuckles	11.50 to 12.00
Locomotive tires, 42 in. and over, smooth inside	10.00 to 10.50
No. 1 dealers' forge	8.50 to 9.00
Cast iron borings	5.50 to 6.00
No. 1 busheling	8.50 to 9.00
No. 1 boilers cut in sheets and rings	6.00 to 6.50
No. 1 railroad cast	13.50 to 14.00
Stove plate and light cast	12.50 to 13.00
Railroad malleable	10.50 to 11.00
Agricultural malleable	10.50 to 11.00
Pipes and flues	7.50 to 8.00
Heavy railroad sheet and tank	6.00 to 6.50
Light railroad sheet	3.50 to 4.00
Railroad grate bars	10.50 to 11.00
Machine shop turnings	3.00 to 3.50
Country mixed iron	6.50 to 7.00
Uncut railroad mixed	9.50 to 10.00
Horseshoes	9.50 to 10.00
Railroad brake shoes	10.50 to 11.00

Birmingham

BIRMINGHAM, ALA., March 21.

Pig Iron.—At the close of the week the Birmingham iron market was buoyant except as to price. The base remained at $15 to $15.50. Makers expect price to harden following the brisk business done and being done. One maker sold 3000 tons to Belleville, Ohio, stove works, one plant taking 1600 tons. San Francisco took 500 tons at $15.50 and wants more. A Michigan melter took 750 tons. Sales have been scattered throughout the South, Middle West and Northwest. Woodward Iron Co. blew in its banked furnace and now has three active. One maker has sold March make and 10,000 tons additional for March delivery, has sold capacity for April and 60 per cent of capacity for May. Another maker with no iron on yards has booked April and May to 80 per cent of capacity and two interests have made some third quarter bookings where customers insisted on connecting them with second quarter orders. Several lots of Sheffield iron on the base of $16 Sheffield were taken by St. Louis melters. Some Eastern business is being figured on and there was a competitive bid on a lot for Pennsylvania. One maker figures putting in another blast furnace soon to care for large bookings and this will probably be done. Active stacks in Alabama now include eight on basic, seven on merchant iron and two on charcoal iron. Small sales of charcoal iron were made the past week. A sanitary manufacturing company with plant at Louisville took 1000 tons of foundry. Consumers are showing a decided interest in forward delivery and there is general conviction that prices have reached the bottom.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25	$15.00 to $15.50
Basic	14.00 to 14.50
Charcoal, warm blast	32.00

Finishing Mills.—In order to have more iron for steel mill purposes, the Tennessee Company blew in

No. 2 stack at Bessemer Monday. It now has seven furnaces on basic iron and is operating the open-hearth plant with nine furnaces on full turn with rail mill on turn of 10,000 tons. Other mills are operating at good capacity as evidenced by increase in blast furnace and open hearth operations. The American Steel & Wire Co. and Gulf States Steel Co. are around 60 per cent of capacity with steady influx of new business.

Cast Iron Pipe.—The American Cast Iron Pipe Co. booked 3000 tons for Seattle and the McWane Iron Pipe Co. booked additional tonnage of its handilength high pressure pipe for Honolulu. Pressure pipe is strong at $33 base. Sanitary pipe brokers began coming into the market again last of week.

Coal and Coke.—Birmingham district operators have tentative arrangements to supply certain concerns dependent on competitive field in case the strike necessitates that supply. Alabama is so completely non-union that no strike worthy the name can occur here. Coke is strong at $5. Monterey, Mex., is figuring on a large tonnage.

Old Material.—Cast scrap is active owing to demand on part of pipe shop and steel scrap is beginning to show some strength. Dealers are not yet inclined to raise prices. Yards are short on stocks and buying what is offered.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	$11.00 to $12.00
No. 1 steel	10.00 to 11.00
No. 1 cast	14.00 to 15.00
Car wheels	13.00 to 14.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	12.00 to 13.00
Stove plate	11.00 to 12.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

Buffalo

BUFFALO, March 21.

Pig Iron.—Buying is more general and from a continually widening circle. The price situation shows no change and $18 is the usual quotation irrespective of silicon. A number of carload sales at $18.50 have been made and one furnace has sold some tonnages of this character at $18.75. The largest inquiries now engaging local furnaces are one for 2000 tons and one for 1000 tons. The Donner Steel Co. has two furnaces blowing on foundry iron. The total placement for the week does not exceed 5000 tons.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.	$18.50 to $19.00
No. 2X foundry, 2.25 to 2.75 sil.	18.50 to 19.00
No. 2 plain, 1.75 to 2.25 sil.	18.00 to 18.50
Basic	18.00 to 18.25
Malleable	18.00 to 18.50
Lake Superior charcoal	26.14

Finished Iron and Steel.—The greater buying activity which was apparent a week ago continues and is felt in finished lines such as wire products more than in bars, shapes or plates. Strengthening of wire prices has served to stimulate buying and the 1.50c. price on bars, shapes and plates is more generally observed. Automobile activity has helped the leading wire maker and the enlarged Ford program for the month of March has greatly stimulated operation at this mill. Outside Buffalo, price shading on sheets is reported, but the Buffalo market is firm at $3c. Release of shipping instructions on some very old contracts has also encouraged sellers. Improvement in demand for cold rolled material is a new development and pipe business has also come in in greater quantity. These improvements are mostly from small buyers. An inquiry for 500 tons of reinforced bars for a Canadian interest is engaging two local makers. The general contract for a new high school at Niagara Falls which will require 500 tons of shapes has been awarded but the steel order has not been placed.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.65c.; plates, 2.65c.; plates, No. 8 gage, 3.35c.; soft steel bars and shapes, 2.55c.; hoops and bands, 3.15c.; blue annealed sheets, No. 10, 3.40c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.40c.

Coke.—So many foundries have ordered ahead that the leading seller is virtually out of the market. Prices are stronger, heating coke now being quoted at $3.50 and best grades of foundry from $4.50 to $5.50.

Old Material.—A number of sales of heavy melting steel at $14 have been made. Considerable negotiating is going on between dealers in possession of stocks of steel, with the dealers who settled with the bar maker for $21 on an old contract, an account of which was published in THE IRON AGE last week. Demand for borings from Eastern points has been brisk and greater activity in hydraulic compressed and No. 1 machinery cast is also evident.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	$13.50 to $14.00
Low phos., 0.04 and under	16.50 to 17.00
No. 1 railroad wrought	15.00 to 16.00
Car wheels	16.50 to 17.50
Machine shop turnings	8.00 to 9.00
Cast iron borings	9.50 to 10.00
Heavy axle turnings	12.00 to 12.50
Grate bars	12.00 to 13.00
No. 1 busheling	10.00 to 11.00
Stove plate	14.00 to 15.00
Bundled sheet stampings	8.00 to 9.00
No. 1 machinery cast	17.00 to 18.00
Hydraulic compressed	10.50 to 11.50
Railroad malleable	13.00 to 14.00

British Iron and Steel Market

(By Cable)

LONDON, ENGLAND, March 21.

Engineering and shipbuilding labor disputes continue. The Government has refused intervention.

German steel works are endeavoring to purchase their supplies direct from the mine owners.

Continental material is quiet. French foundry pig iron is held at £5 5s. to £5 10s. ($23 to $24.09) f.o.b. Luxemburg and Belgian foundry pig iron is quoted at £5 to £5 5s. ($21.90 to $23) f.o.b. Cleveland foundry hematite is competing on the Continent.

Belgian, French and Luxemburg merchant bars are obtainable at £8 to £8 10s. (1.56 to 1.66c. per lb.) f.o.b., for May and June delivery. Belgian angles are held at £10 7½s. (2.03c. per lb.) c.i.f. Japan.

Luxemburg structural beams are quoted at £7 10s. to £7 15s. (1.47 to 1.51c. per lb.) f.o.b., for April and May shipments. French beams are held at £8 (1.56c. per lb.) f.o.b., for April and May delivery. Belgian beams are quoted at £7 12½s. to £7 15s. (1.49 to 1.51c. per lb.) f.o.b., for April and May shipment. Belgian 3/16-in. plates are held at £8 12½s. to £9 (1.69 to 1.76c. per lb.) f.o.b., for May and June delivery.

French wire rods are quoted at £9 5s. ($40.51) f.o.b., for June shipment. Belgian billets are held at £6 10s. ($28.47) f.o.b., for April delivery. Belgian sheet bars are quoted at £6 12½s. to £6 15s. ($29.02 to $29.56) f.o.b., for April shipment.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at $4.38 per £1, as follows:

Durham coke, delivered	£1	9s.			$6.35	
Cleveland No. 1 foundry	4	15			20.80	
Cleveland No. 3 foundry	4	10			19.71	
Cleveland No. 4 foundry	4	7½			19.16	
Cleveland No. 4 forge	4	10			19.71	
Cleveland basic	4	10			19.71	
Hematite	7	0*			30.66*	
East Coast mixed	5	0	to £5	2½s.	$21.90 to	$22.45
East Coast hematite	4	17½	to 5	0	21.35 to	21.90
Ferromanganese	15	0	& 14	10*	65.70 &	63.51*
Rails, 60 lb. and up	8	0	to 9	10	35.04 to	41.61
Billets	7	0	to 7	10	30.66 to	32.85
Sheet and tin plate bars, Welsh	7	0	to 7	7½	30.66 to	32.30
Tin plates, base box	0	18¾	to 0	19½	4.11 to	4.27
					C. per Lb.	
Ship plates	9	5	to 10	10	1.81 to	2.05
Boiler plates	12	10	to 14	0	2.44 to	2.74
Tees	9	10	to 11	0	1.86 to	2.15
Channels	8	15	to 10	5	1.71 to	2.00
Beams	8	10	to 10	0	1.66 to	1.95
Round bars, ¾ to 3 in.	10	10			2.05	
Galvanized sheets, 24 g.	16	0	to 16	5	3.13 to	3.18
Black sheets	12	10	to 12	15	2.44 to	2.49
Steel hoops	12	0	& 12	5*	2.35 &	2.39*
Cold rolled steel strip, 20 g.	23	10			4.53	

*Export price.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic	$0.36	Kansas City	$0.815
Philadelphia, export	0.265	Kansas City (pipe)	0.77
Baltimore, domestic	0.35	St. Paul	0.665
Baltimore, export	0.255	Omaha	0.815
New York, domestic	0.38	Omaha (pipe)	0.77
New York, export	0.285	Denver	1.35
Boston, domestic	0.405	Denver (wire products)	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates	1.335
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail	0.555
Cincinnati	0.325	Jacksonville, rail and water	0.46
Indianapolis	0.345	New Orleans	0.515
Chicago	0.38		
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, $1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2½c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, ¼ in. thick and over, and zees, structural sizes, 1.40c. to 1.50c.

Sheared plates, ¼ in. and heavier, tank quality, 1.40c. to 1.50c.

Wire Products

Wire nails, $2.40 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of $1.25 and shorter than 1 in., $1.75; bright Bessemer and basic wire, $2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.25; galvanized wire, $2.75; galvanized barbed wire, $3.05; galvanized fence staples, $3.05; painted barbed wire, $2.55; polished fence staples, $2.55; cement-coated nails, per count keg, $1.90; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 70½ per cent off list for carload lots; 69½ per cent for 1000-rod lots, and 68½ per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 10 per cent off list
Machine bolts, small, cut threads....70 and 10 per cent off list
Machine bolts, larger and longer....70 and 10 per cent off list
Carriage bolts, ¾ in. x 6 in.:
Smaller and shorter rolled threads.70 and 10 per cent off list
Cut threads .....70 per cent off list
Longer and larger sizes.....70 per cent off list
Lag bolts .....70, 10 and 5 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads....60 and 10 per cent off list
Other style heads.....20 per cent extra
Machine bolts, c.p.c. and t. nuts, ⅜ in. x 4 in.:
Smaller and shorter.....65, 10 and 5 per cent off list
Larger and longer sizes.....65 and 10 per cent off list
Hot pressed sq. or hex. blank nuts.....$5.50 off list
Hot pressed nuts, tapped.....$5.25 off list
C.p.c. and t. sq. or hex. blank nuts.....$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped.....$5.00 off list
Semi-finished hex. nuts:
¼ in. to 9/16 in. inclusive..80, 10, 10 and 10 per cent off list
Small sizes S. A. E.....80 and 10 per cent off list
⅝ in. to 1 in. inclusive, U. S. S. and S. A. E., 70, 10, 10 and 10 per cent off list
Stove bolts in packages....80 and 3 tens and 5 per cent off list
Stove bolts in bulk.....80, 3 tens and 2½ per cent off list
Tire bolts .....70, 10 and 5 per cent off list
Track bolts, carloads.....3c. base
Track bolts, less than carloads.....3.75c. to 4c. base

Upset and Hex. Head Cap Screws

½ in. and under.....80 and 10 to 80, 10 and 10 per cent off list
9/16 in. to ¾ in.....80 and 10 to 80, 10 and 10 per cent off list

Upset Set Screws

½ in. and under.....80, 10 and 5 to 85 per cent off list
9/16 in. to ¾ in.....80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes .....75 and 10 to 80 per cent off list

Milled Set Screws

All sizes .....70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets.....$2.00 to $2.10
Large boiler rivets..... 2.10 to 2.20
Small rivets .....75 and 10 off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, $36; chain rods, $36; screw stock rods, $41; rivet and bolt rods and other rods of that character, $36; high carbon rods, $43 to $46, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, $2 to $2.10 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, ½-in., ⅝-in. and 7/16-in., $2.15 to $2.25 base; 5/16-in., $2.15 to $2.25 base. Boat and barge spikes, $2.15 to $2.25 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 3c. base per 100 lb. Tie plates, $1.75 per 100 lb. Angle bars, $2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., $9.30 per package; 8-lb. coating, I. C., $9.60; 15-lb. coating, I. C., $11.80; 20-lb. coating, I. C., $13; 25-lb. coating, I. C., $14.25; 30-lb. coating, I. C., $15.25; 35-lb. coating, I. C., $16.25; 40-lb. coating, I. C., $17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.40c. to 1.50c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	54½	28	¼ to ⅜	+ 3½	+22½
¼ to ⅜	60	33½	½	36½	18½
½	65	50½	¾	42½	27½
¾	69	56½	1 to 1½	44½	29½
1 to 3	71	58½			

Lap Weld

2	64	51½	2	39½	25½
2½ to 6	68	55½	2½ to 6	42½	29½
7 to 8	65	51½	7 to 12	40½	27½
9 to 12	64	50½			

Butt Weld, extra strong, plain ends

¼	50½	33	¼ to ⅜	+ 4½	+27½
¼ to ⅜	56	38½	½	35½	23½
½	62	50½	¾	42½	28½
¾	67	55½	1 to 1½	44½	30½
1 to 1½	69	57½			
2 to 3	70	58½			

Lap Weld, extra strong, plain ends

2	62	50½	2	40½	27½
2½ to 4	66	54½	2½ to 4	43½	31½
4½ to 6	65	53½	4½ to 6	42½	30½
7 to 8	61	47½	7 to 8	35½	23½
9 to 12	55	41½	9 to 12	30½	18½

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2½ per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		*Charcoal Iron*	
1¾ in.	26½	1½ in.	5
2 to 2¼ in.	41	1¾ to 1⅞ in.	15
2½ to 3 in.	52	2 to 2¼ in.	25
3¼ to 13 in.	57	2½ to 3 in.	30
		3¼ to 4½ in.	32

To large buyers of steel tubes, a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed

Cents per Lb.		Cents per Lb.	
No. 8 and heavier	2.20	Nos. 11 and 12	2.30
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.35
		Nos. 15 and 16	2.45

Box Annealed, One Pass Cold Rolled

Cents per Lb.		Cents per Lb.	
Nos. 17 to 21	2.80	No. 28 (base)	3.00
Nos. 22 to 24	2.85	No. 29	3.10
Nos. 25 and 26	2.90	No. 30	3.20
No. 27	2.95		

Galvanized

Cents per Lb.		Cents per Lb.	
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50

Tin-Mill Black Plate

Cents per Lb.		Cents per Lb.	
Nos. 15 and 16	2.80	No. 28 (base)	3.00
Nos. 17 to 21	2.85	No. 29	3.05
Nos. 22 to 24	2.90	No. 30	3.05
Nos. 25 to 27	2.95	Nos. 30½ and 31	3.10

PERSONAL

Charles F. Smith, chairman of the board of directors of the New Britain Machine Co., New Britain, Conn., recently resigned.

Vincent S. Whitney has become sales manager of Bridgeport sales for the Shea Foundry & Machine Co., Bridgeport, Conn.

Louis W. Arny, secretary of the Leather Belting Exchange, Philadelphia, addressed the Meriden, Conn., branch of the American Society of Mechanical Engineers, on leather and leather belting, at a meeting held at the Home Club, Meriden, March 16.

Albert Turner recently joined the engineering department of the Heald Machine Co., Worcester, Mass. Mr. Turner was formerly with the Norton Co., Worcester, where he was engineer for 19 years.

M. M. Marcus, E. M., Met. E., and general superintendent Rhode Island Malleable Iron Works, Hillsgrove, R. I., on March 14 spoke before the Providence Engineering Society, Providence, R. I., on certified malleable iron castings, describing the modern scientific practice in the manufacture of malleable iron castings.

Harry V. Hayman, sales manager Automatic Machine Co., Bridgeport, Conn., recently resigned, has accepted a position as sales manager of the Wellman-Seaver-Morgan Co., Cleveland. Mr. Hayman was with the Automatic Machine Co. for 13 years.

John C. Neale, vice-president in charge of sales of the Midvale Steel & Ordnance Co., Philadelphia, accompanied by Mrs. Neale, has left on a business trip to the Pacific Coast.

Webster D. White has resigned from the position of secretary and treasurer of Kemsley, Millbourn & Co., Ltd., 90 West Street, New York, and Robert R. Appleby has been appointed in his stead.

George E. Learnard, president International Combustion Engine Co., New York, sailed March 21 on the Aquitania for London. Mr. Learnard will be engaged part of his time on business of the company in London and will spend some time on the continent.

W. P. Paul has been appointed by the General Drop Forge Co., Inc., Buffalo, as Eastern district representative, with offices in the Woolworth Building, New York. He will also have charge of the Philadelphia offices In the Drexel Building.

W. A. Thomas, former president of the Brier Hill Steel Co., has been elected a director of the General Fireproofing Co., Youngstown, Ohio, succeeding R. M. Bell, resigned. The latter continues as secretary-treasurer.

William Ochse, for the past two years sales representative Manning, Maxwell & Moore, Inc., at Chicago, has resigned to become efficiency engineer the Ohio Machine Tool Co., Kenton, Ohio, manufacturer of shapers and planers, effective April 1. Before joining the sales organization of Manning, Maxwell & Moore, Mr. Ochse was for 20 years with Gould & Eberhardt, manufacturers of shapers and automatic gear and rack cutting machinery, Newark, N. J., latterly having charge of their planning and tool design department.

J. R. Camm has been appointed assistant to C. J. Sturgeon, manager of the Cleveland office of the Kearney & Trecker Corporation, milling machines, Milwaukee, and will cover the southern part of Ohio, with residence at Dayton. Mr. Camm is a brother of John A. Camm, sales manager of the Kearney & Trecker Corporation, and has been connected with the Milwaukee office for the past two years.

Nils Anderson, president Debevoise-Anderson Co., Inc., was elected a director of the Queen's Run Refractories, Inc., Lock Haven, Pa., at the annual meeting of latter company, in Boston March 14.

John J. Brant, for 20 years identified with the accounting department of the Youngstown Sheet & Tube Co., who retired Jan. 1 as general auditor, has been appointed secretary of the Sinking Fund Commission of Youngstown, Ohio.

Joseph G. Butler, Jr., is slowly convalescing at his home in Youngstown from injuries sustained last year when he was struck by a motor truck. Mr. Butler receives friends and business callers each day at his residence, 525 Wick Avenue and transacts business from his home. Almost every day he visits the McKinley Memorial building at Niles, Ohio, which he was instrumental in building.

Charles A. Sargeant has been elected president of the Domhoff & Joyce Company, pig iron merchants, Cincinnati, to succeed his father, the late Col. John Sargeant, who died on March 4. Mr. Sargeant has also been appointed a colonel on the staff of Governor Edwin P. Morrow of Kentucky, the honor being conferred as a tribute to himself and to the memory of his father. Mr. Sargeant is one of the youngest men to ever receive such an honor.

W. J. Metcalf has been chosen as assistant to the president of the Yale & Towne Mfg. Co., Stamford, Conn., and Richard G. Plumley, has been made manager of the order department, as per announcements just made by President Walter C. Allen.

William H. Hulick, Jr., son of William H. Hulick, president Warren Foundry & Machine Co., 11 Broadway, New York, has joined the sales force of that company. He was formerly with the Frederick Snare Corporation, 8 West Fortieth St., New York.

Horace S. Peck, comptroller, S-K-F Industries, Inc., New York has resigned through reorganization of the personnel of the company and has been succeeded by T. W. Dinlocker, formerly assistant comptroller. Both Mr. Peck and Mr. Dinlocker had been associated with the company for about two years.

Prof. J. H. Moffett, formerly metallurgical engineer at the University of Cincinnati, but at present in charge of foundry practice in the department of mechanical engineering at the University of Minnesota, Minneapolis, is carrying out a research on the Relative Rates of Elimination of Oxidizable Elements in Cast Iron.

Norman L. Snow has resigned as vice-president and active head of the Terry Steam Turbine Co., Hartford, Conn., to become president and treasurer of the Diamond Power Specialty Corporation, Detroit, a new company which has purchased the business and plant of the Diamond Power Specialty Co., a copartnership, the members of which are retiring from the soot blower business in the western hemisphere.

W. C. Allen, former manager of the Philadelphia branch of the Black & Decker Mfg. Co., Baltimore, and subsequently special representative, has been made branch manager of the Black & Decker Chicago territory.

The New Spanish Tariff

WASHINGTON, March 18.—While in some instances the changes are only slight, the general trend of duties carried in the new Spanish tariff as it affects iron and steel products and machinery is decidedly upward. The new tariff as explained by Henry Chalmers, Chief Division of Foreign Tariff, Bureau of Foreign and Domestic Commerce, continues the two scales of duty known as the "First" and "Second" tariffs. While Spain has abrogated most of her commercial treaties preliminary to this revision of the tariff, the products of most countries, including the United States, are being temporarily granted most-favored-nation treatment, including the rates of the "Second," or lower tariff, which are the only ones here shown. The rates of the "First" tariff are, as a rule, two to three times as high as the "Second," and are to be applied to such countries as do not within a reasonable period open negotiations for reciprocal favored-nation treaties with Spain.

OBITUARY

EDWARD M. BARR, manager of the Chicago office of Chisholm-Moore Mfg. Co., died March 15. Mr. Barr had complained of not feeling well for several days and dropped dead suddenly while downtown in Chicago. He had been with the company 11 years, in charge of the Chicago office, and has a wide acquaintance in the Chicago district. Mr. Barr was born and raised in Milwaukee and lived there until he went into business about 20 years ago. He was the son of J. M. Barr, formerly assistant to President A. J. Earling of the Chicago, Milwaukee & St. Paul Railroad, and one of the pioneer railroad men in the West. He leaves his wife and one son.

MRS. HENRIETTA ELIZABETH BROWN died last week at Newton Center, Mass. She was the daughter of the late Henry J. R. Farnum, senior partner of the Davis & Farnum Mfg. Co., Waltham, Mass., iron founders. In 1877 she was married to Frank H. Brown, manager of the same concern. He died four years ago, and, since that time, the widow served as vice-president of the company and took an active interest in its affairs.

JAMES A. DOUGHTY, president Torrington Mfg. Co., Torrington, Conn., died of heart failure at his home March 15. Mr. Doughty was very well known in industrial activities of the New England States, and held official positions with several concerns. He also served as an official of the American Brass Co., Waterbury, Conn., for a number of years. He was 71 years of age.

GORDON M. MCGREGOR, of Windsor, Ont., vice-president and general manager of the Canadian Ford Motor Co., who died last week, was a prominent industrial figure of Canada. When his father died in 1903, he succeeded to the presidency of the Walkerville Wagon Works, a rather unprofitable concern, and it was from this nucleus that Mr. McGregor developed the Canadian branch of the Ford Motor Co., which became one of the most extensive and profitable manufacturing companies in the Dominion. The new company was started with a capitalization of $125,000, of which Mr. McGregor raised $40,000 himself by selling stock. Henry Ford received 51 per cent of the stock in return for his patents and a contract reserving Canada for the new company. In 1911 the capitalization was increased to $1,000,000, and in 1916 to $10,000,000.

HARRY DEAN BUSH, general superintendent of the Carnegie Steel Co., Baltimore, died on March 15 at his home in Baltimore, aged 64. Mr. Bush was born in Springfield, Mass. He began his career as a civil engineer with the old R. F. Hawkins bridge plant at Springfield, and at the end of two years became bridge engineer for the Northern Pacific Railroad. He also served for a year as assistant engineer in the office of George S. Morrison, New York, and later became superintendent for the Dominion Bridge Co., Ltd., Montreal. In 1903 Mr. Bush became vice-president and manager of the Baltimore Bridge Co., Baltimore. He was a member of the American and Canadian Societies of Civil Engineers and the Engineers' and Whitehall Clubs of New York.

CHARLES H. BOLLES, aged 90, of Bolles, White & Co., Hartford, Conn., hardware dealers, died March 9, at his home in Charlestown. Mr. Bolles was born in Hartford in 1831, going to Boston in 1861, where he engaged in the hardware business, later becoming a member of the firm of Benjamin Callender & Co. This company later became Bolles, White & Co. Mr. Bolles had not taken an active part in the business for the past 15 years.

Management, "looking backward and forward," is to be discussed at a meeting of the Providence Engineering Society on the evening of April 4 by Carle M. Bigelow, of the Cooley & Marvin Co., accountant, appraiser and engineer, Boston.

ORE RATE CONTROVERSY

Railroads File Tariffs of New Rates Opposed by Buffalo Furnaces

WASHINGTON, March 21.—Railroads have filed tariffs with the Interstate Commerce Commission proposing reductions, effective April 17, of 20 per cent in ore handling charges and in ore rates from lower Lake ports to interior furnaces. The tariffs are in accordance with those which were specified in the Cleveland report of THE IRON AGE last week. The new schedules began to arrive on March 16, the first being those of the Buffalo, Rochester & Pittsburgh Railroad, which provided lower rates and charges from Buffalo on traffic to DuBois (Adrian furnace), Josephine, Lindsey and Punxsutawney, Pa., and are typical of the others that have been filed as they relate to the percentage of reductions in rates and handling charges.

The following table shows the present and proposed line haul rates over the Buffalo, Rochester & Pittsburgh Railroad, together with the charge for handling ore from vessels to the car and the aggregate:

Rates on Traffic Originating in the United States
From Buffalo (B., R. & P. Tracks)

To	Present Rates			Effective April 17, 1922		
	Line Haul	Handling Vessel to Car	Aggregate	Line Haul	Handling Vessel to Car	Aggregate
DuBois (Adrian Furnace)	98	8½	106½	78	7	85
Josephine	119	8½	127½	95	7	102
Lindsey / Punxsutawney	98	8½	106½	78	7	85

As pointed out in THE IRON AGE of last week, Buffalo iron and steel makers have protested against the reduced rates and have asked that they be suspended.

Previous to their decision to make the 20 per cent cuts, executives of the Eastern carriers held a conference with executives of the Northwestern railroads carrying ore from the mines in the Lake Superior region to upper docks. The representatives of the Eastern lines suggested that the Northwestern carriers make a 25 per cent reduction in the rates from the mines to the upper docks. Apparently this was done both to placate the Buffalo district producers and have them withdraw their protest and to have the Lake Superior ore shippers withdraw their complaint in the so-called Adriatic Mining Co. case against rates on ore from Lake Superior mines to upper ports. It has been stated that even if this reduction had been proposed, it would not have been acceptable to either the Buffalo iron and steel producers or the ore interests in the Lake Superior district. The former are urgently seeking lower coal and coke rates before agreeing to reduced ore rates from lower Lake ports and also contend that ore rates already are relatively lower than fuel rates to Buffalo. At the same time, ore interests in the Lake Superior district not only are asking for reduced rates, but are also asking for restoration of the old relationship of rates between the Minnesota mines on the one hand and the old range mines on the other.

The upper Lake lines themselves strongly opposed any reductions and flatly refused to make them. Their representatives expressed the opinion that a 25 per cent reduction would not satisfy the complainants in the Adriatic case and they emphasized the fact that these complainants were also seeking restoration of the old relationship of rates. They also expressed doubt as to the ability of the Eastern carriers to persuade the Lake front furnace interests to withdraw their opposition simply by showing them that it would be to their advantage if a cut were made in rates from mines to upper docks, though the Buffalo producers are asking that this be done, but do not stop there. The executives of the Northwestern carriers also claimed that such a cut would be to the advantage of the interior furnaces and consequently leave unsolved the question of relationship between rates on ore from the lower Lake ports to interior furnaces and the rates on coal and coke from the mines and ovens near the interior furnaces to Lake front furnaces.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Straits Tin	Lead		Zinc	
March	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis
15.....	13.00	12.75	29.12½	4.70	4.42½	5.00	4.65
16.....	13.00	12.75	28.62½	4.70	4.42½	5.05	4.70
17.....	13.00	12.75	29.00	4.70	4.42½	5.05	4.70
18.....	13.00	12.75	.....	4.70	4.42½	5.05	4.70
20.....	13.00	12.75	29.00	4.70	4.42½	5.07½	4.72½
21.....	13.00	12.75	29.12½	4.70	4.42½	5.07½	4.72½

*Refinery quotation.

New York

NEW YORK, March 21.

The markets are only moderately active and prices are steady to firm. Buying of copper has been in good volume but prices are no higher. The tin market has been exceedingly dull with prices fairly steady. Lead consumption continues in steady volume. The zinc market is fundamentally unchanged but prices are a little stiffer.

Copper.—Despite the fact that according to various estimates sales of copper thus far this month have been between 70,000,000 and 100,000,000 lb., prices have not advanced. It is still possible to buy electrolytic copper for any delivery through May at 13c., delivered, or 12.75c., refinery. Inquiries and sales are not quite as numerous this week as last, but the volume is good with both domestic and foreign sales involved. Some producers are unwilling to sell at present prices, but the market in general is fairly broad.

Tin.—The market for Straits tin has been extremely quiet with hardly one day of real activity in the past week. Prices have hovered around 29c., New York, for spot Straits with the quotation to-day at 29.12½c., New York. Consumers are apparently well provided despite the pronounced activity in the tin plate market. Prices in London to-day were about £1 per ton higher than a week ago, with spot standard at £143 7s. 6d., future standard at £144 17s. 6d. and spot Straits at £145 17s. 6d. Arrivals thus far this month have been 5675 tons with 6165 tons reported afloat.

Lead.—Buying of lead continues in a volume apparently equal to production and there has been substantially no change in prices, except a slightly stronger market at St. Louis. The leading interest still quotes 4.50c., St. Louis, or 4.70c., New York, with wholesale lots for early or April delivery, while independents are selling on a basis of 4.40c. to 4.45c., St. Louis, sales being noted at both these levels, and 4.70c. to 4.75c., New York and Eastern points.

Zinc.—The gradual advance in prices for prime Western zinc, which has been going on for some weeks, continues and quotations are slightly higher at 4.72½c., St. Louis, or 5.07½c., New York, for wholesale lots for March-April delivery, although spot delivery can be obtained at 4.70c., St. Louis, or 5.05c., New York. The apparent strength of the market is due more to the attitude of sellers than to any marked increase in demand.

Old Metals.—Business is more active and values are firmer. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	12.50
Copper, heavy and wire	11.50
Copper, light and bottoms	9.50
Heavy machine composition	9.50
Brass, heavy	7.25
Brass, light	5.75
No. 1 red brass or composition turnings	8.00
No. 1 yellow rod brass turnings	6.25
Lead, heavy	4.25
Lead, tea	3.25
Zinc	3.00

Antimony.—The market is unchanged at 4.20c., New York, duty paid, for wholesale lots for early delivery.

Aluminum.—The leading interest continues to quote virgin metal, 98 to 99 per cent pure, for early delivery in wholesale lots at 19c. to 19.10c., f.o.b. plant, depending on the quantity and the same grade from foreign sources is quoted by importers at 17c. to 18c., duty paid.

Chicago

MARCH 21.—Although there has been more buying in small lots, the market is on the whole very quiet. Lead and zinc have advanced slightly. The old metals are unchanged. We quote in carload lots: Lake copper, 13.25c. to 13.50c. tin, 30.50c.; lead, 4.55c.; spelter, 4.80c.; antimony, 6c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 9.50c.; copper bottoms, 7.50c.; red brass, 7.50c.; yellow brass, 6c.; lead pipe, 3.25c.; zinc, 2c.; pewter, No. 1, 22c. tin foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

MARCH 21.—The market for lead and zinc is slightly better. We quote lead at 4.35c. to 4.45c., car lots, and slab zinc, 4.65c. to 4.75c. On old material we quote: Light brass, 3.50c.; heavy red brass, 7c.; light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Some Improvement in February Fabricated Steel Business

In February 78,700 tons of fabricated structural steel work was contracted for throughout the United States, against 72,100 tons in January and 71,500 in December. The improvement of February over January is not quite 10 per cent, while the average February bookings for the preceding decade have averaged 13½ per cent over the January bookings for the same ten years. In short, the average February tonnage booked for the years 1912 to 1921, inclusive, has been 94,000 tons and the corresponding figure for January 82,800 tons.

The tabulation of the volume of business taken by the bridge and structural shops of the country was made by George E. Gifford, secretary of the Bridge Builders and Structural Society, 50 Church Street, New York. It indicates that 43½ per cent of shop capacity was covered, the total monthly capacity being put at 180,000 tons. The volume of business in January was 40 per cent of capacity. Incidentally, as a possible commentary on the large fabricating capacity of the country, it may be added that for all of the preceding decade the average amount of business did not take more than 55 to 60 per cent of the capacity of the country's shops.

Rehearing Asked in Hardwood Case

WASHINGTON, March 21.—Motion for rehearing or modification of the United States Supreme Court's decree in the American Hardwood case will be made by L. C. Boyle, general counsel, this week. He will ask the highest tribunal to more definitely state whether its judgment in the so-called open-competition case means absolute prohibition or inhibition on gathering industrial statistics and the distribution of this data to memberships of various trade organizations. The court will also be requested to determine whether such activity is prohibitive only when used in connection with other factors of the trade association work which reflect agreement or understanding as to fixed prices or curtailed production. The outcome of the Supreme Court action in this matter will be of utmost importance to all lines of industry. The trade associations are manifestly uncertain as to methods of procedure in view of the hardwood decision. Secretary of Commerce Hoover is cognizant of the situation and as a consequence, has called a meeting of various trade bodies in this city on April 12, for the purpose of discussing trade association work and devising lines of operation in accordance with the views of the Department of Justice and the Department of Commerce.

IRON AND INDUSTRIAL STOCKS

Trend of Values Indicates Confidence Among Investment Public

The investment security market has shown little uneasiness over the pending scheduled coal strike. Industry has had ample time to secure adequate supplies of bituminous to tide it over several weeks. The firmer undertone of prices as quoted in such basic industries as the steel and pig iron, together with recoveries in grain and cotton values, indicates a strengthening of buying power, and, with continued ease in the money market in the face of larger outstanding loans, explains in a large measure the confidence felt in security investment circles. Individual developments like the passing of the Crucible Steel dividend temporarily check the movement, but the trend of stock values in general continues upward. The stability of stocks like United States Steel common, General Electric and Union Pacific is a sustaining influence on investment sentiment.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chal. com..	46¼- 47⅝	Lima Loco. com.	101 -104¼
Allis-Chal. pf....	92 - 93½	Lima Loco. pf...	101¼-106
Am. B.S. & F. cm.	58 - 60¾	Midvale Steel....	29½- 32⅞
Am. B.S. & F. pf.	103 -107	Nat.-Acme	12⅛- 13
Am. Can com...	44 - 47⅝	Nat. E. & S. com.	35 - 37½
Am. Can pf.....	102½-104	Nat. E. & S. pf..	.. - 85
Am. C. & F. com.	152 -156¾	N. Y. Air Brake.	62½- 63
Am. Loco. com..	108 -109⅜	Nova Scotia Steel	23 - 25
Am. Loco. pf....	117 -118	Otis Steel	10⅛- 12⅜
Am. Rad. com...	87 - 90¼	Otis Steel pf....	45 - 46
Am. St. Fd. com.	33½- 34	Pittsburgh St. pf.	85 - 86
Bald. Loco. com.	106½-108¼	Pressed St. com.	68 - 72
Bald. Loco. pf...	.. -109	Pressed St. pf...	92 - 93
Beth. Steel com..	59¾- 68⅜	Ry. St. Sp. com..	97½- 99
Beth. St. Cl. B..	63¾- 65¼	Ry. St. Sp. pf...	.. -115¼
Beth. St. 8% pf..	.. -109	Replogle Steel ..	30¾- 33
Brier Hill St. cm.	.. - 17½	Republic com. ..	50¼- 51¾
Brit. Em. Steel..	8¾- 9	Republic pf.	77¼- 78⅜
Brit. Em. St. 1 pf.	59¾- 61½	Sloss com.	36¾- 41¼
Brit. Em. St. 2 pf.	19½- 19½	Steel & Tube....	69⅞- 74
Chic. Pneu. Tool.	65⅞- 66	Steel of Can.....	57 - 62
Colo. Fuel	27¾- 30½	Stewart-Warner..	36 - 37½
Crucible St. com.	53¼- 58½	Superior Steel...	27 - 27¾
Crucible St. pf...	80 - 85	Transue-Williams	33¼- 37
Deere & Co. pf..	71 - 71½	Un. Alloy Steel..	28¼- 30¼
Gen. Electric ...	155 -156¼	U. S. Pipe com..	31½- 38¾
Gt. Nor. Ore Cert.	34¾- 36⅛	U. S. Pipe pf....	64 - 70
Gulf States Steel	71 - 74¾	U. S. Steel com..	94 - 96¼
Harbison-Walker.	96 - 96½	U. S. Steel pf...	116⅞-117⅞
Inland Steel	48½- 49	Vanadium Steel..	37 - 39⅜
Int. Har. com....	92 - 94¾	Va. I. C. & Coke.	44 - 45
Int. Har. pf.....	107¼-110	W'house Air Br.	80 - 85
Lackawanna St..	47¼- 49	W'house Elec. ..	57 - 58⅝

Industrial Finances

The Ohio Body & Blower Co., Cleveland, in its annual report for 1921 shows an operating loss of $391,568. Deductions for interest charges, depreciation, etc., brought the total net loss up to $558,000, leaving a net surplus Dec. 31 of $909,317.

The Youngstown Sheet & Tube Co., Youngstown, Ohio, has declared the regular quarterly dividends of 50c. per share on common stock and $1.75 on preferred, both payable April 1 to holders of record March 20. The common dividend is the same as has been paid quarterly since June 30, 1921.

In common with the machine tool industry, the small tool suffered last year as a result of the business depression, as is shown by the 1921 report of the Chicago Pneumatic Tool Co. That document gives the net income, after providing for Federal taxes and depreciation, as $158,107, contrasted with $1,869,093 for 1920. There was a balance before dividends of $118,364 and a deficit after dividends of $499,286, whereas after paying larger dividends in the previous year there was a surplus of approximately $335,000.

The Union Tank Car Co. reports net earnings for 1921, after deductions for depreciation, amortization and taxes, of $1,602,625, as compared with $3,393,063 in 1920. After dividends on the common and preferred stock there was a deficit of $677,375, against a surplus in 1920 of $2,049,620. Surplus at the close of 1921 stood at $10,815,177, against $11,492,552 at the end of 1920.

The Vanadium Corporation of America for the year ended Dec. 31, 1921, had a net loss after all charges and depreciation of $427,546. The previous report covered 15½ months ended Dec. 31, 1920, and showed net income of $2,573,930, equivalent to $6.62 a share earned on the 373,334 shares of capital stock of no par value in the previous year.

The report of the Harbison-Walker Refractories Co. for the year ended Dec. 31, 1921, shows net profits, after charges, depreciation and Federal taxes, of $1,751,444, as compared with net profits of $2,869,996 in the previous year.

The J. I. Case Threshing Machine Co. has issued its annual report for last year, showing net loss, after all charges, inventory adjustments and depreciation, of $2,883,431. This compares with net profits of $1,936,963 earned on the $13,000,000 outstanding common stock in the previous year.

The Westinghouse Air Brake Co.'s annual report for the year ended Dec. 31 shows net income after charges and inventory adjustments of $705,546, equal to $1.21 a share ($50 par value) earned on the $29,144,200 capital stock outstanding. This compares with net income of $5,330,403, or $9.15 a share in the previous year.

The Alliance Machine Co., Alliance, Ohio, has increased its capital stock from $500,000 to $2,000,000.

The Sterling Brass Co., Cleveland, has increased its capital stock from $100,000 to $3,000,000.

The sale of the plants of the Allen Motor Co., at Columbus, Fostoria, and Bucyrus, Ohio, has been ordered by the court and will take place at the Court House at Columbus, April 18. The court has fixed the minimum price for the sale of the plants at $500,000.

Crucible Passes Dividend

The directors of the Crucible Steel Co. of America have passed the quarterly dividend on the common stock. Horace S. Wilkinson, chairman Crucible Steel Co. of America, issued a statement in part as follows:

"I am of the opinion that long drawn out depression in the steel business is nearing the end and that from now on we shall have a gradual return to more normal business. I believe it will not be long before the company will be able to resume the payment of the dividend on its common stock.

"On March 1, 1922, the company had surplus of $24,032,-121, which may be applied to payment of dividends, but we do not believe this surplus should be reduced at this time, except in payment of dividends upon preferred stock. It will be the policy of the management to resume a reasonable disbursement for dividends on the common stock as soon as the earnings and business conditions improve sufficiently to justify same. Within the last week we have started some of our furnaces and have started to use some of new construction, which have cost us $15,000,000, and which we completed about the time depression began."

The report of the Chicago Railway Equipment Co. for last year shows earnings for 1921 at $350,699. Deducting $150,-000 for depreciation and $239,744 for dividends, leaves $313,-242 as the net profits. President Leigh opposes reductions in freight rates until labor costs have been adjusted downward and he says that to reduce rates before reducing labor costs would be to court disaster, not only to the railroads, but to other industries. On Dec. 31 last the company paid its 101st consecutive dividend.

Report of Receiver of Standard Parts Co.

The Standard Parts Co., Cleveland, has made a profit, before depreciation and adjustment, during its sixteen months under the direction of Frank A. Scott as receiver, according to the annual statement filed in the Federal Court in Cleveland. Net sales for 1921 were $7,223,033, or about one-third of those of the preceding year. This business resulted in a profit, before depreciation and inventory adjustment, of $316,-289. Depreciation for the year was $398,341 and adjustments $204,348, resulting in a loss of $286,400. Including the last four months of 1920, total net sales for the sixteen months to Dec. 31, 1921, were $10,451,881, and after allowance for depreciation and adjustment resulted in a loss of $494,825, or, if omitting the depreciation charge, a gain of $146,360.

Ohio Steel Co. Inventory Write-off

The annual report of Otis Steel Co., Cleveland, for the year ended Dec. 31, 1921, shows net loss after depreciation, interest charges and inventory adjustments of $5,189,543. This compares with net income of $1,141,088 the previous year. Decline in inventory values was a great handicap to the company in 1921, points out President George Bartol in his statement to stockholders. As a result of this, he says, the deficit would have been larger if mills had not been operated at all, as a large part of operating loss could have been properly charged off to inventory depreciation. Mr. Bartol said in part:

"On account of rapid decline in value of stocks since Dec. 31, 1920, inventory was written down as of April 1, 1921, and again as of Dec. 31, 1921, in each case to a fair market value. As the material out of stock was charged to operating at

inventory prices, a considerable part of the operating loss is properly chargeable to inventory depreciation, and approximate estimates indicate that a greater loss would have been made by shutting down completely and writing down the material charged to operation to Dec. 31, 1921, values.

"Our production for the year was only 15 per cent of total capacity. The new sheet mill plant at Riverside works was completed and put into operation during the year and it has fully come up to expectations."

Replogle Steel Co. Deficit

The Replogle Steel Co. reports for the year ended Dec. 31 last net income of $84,029, compared with a loss of $102,267 in the previous year. After depreciation, etc., there was a deficit of $163,768, contrasted with a deficit of $287,854 in 1920. The income account follows:

Net earnings, $58,029; depreciation, etc., $248,797; deficit, $163,768; interest, $354; inventory adjustment, $709,450; total deductions, $709,804; deficit, $873,572; previous surplus adjusted, $386,231; total surplus, $512,659.

The report states that the only income last year came from railroad earnings and interest on securities owned. A small volume of business was offered to the company, which, if taken, would have resulted in a loss, so that operations were not started.

Stocks at Youngstown

YOUNGSTOWN, March 21.—Under influence of dividend payments April 1, preferred stocks of industrial issues are slightly firmer. Common stock of the Youngstown Sheet & Tube Co. has been fluctuating from $63 to $64 on the Cleveland and Youngstown exchanges, which compares with a recent trading level of $60.

Common of the Brier Hill Steel Co. is held at $17.50, while the junior issue of the Trumbull Steel Co. is listed at $19.50.

Dividend declarations by the Sheet & Tube Co. for the first quarter will mean a distribution of $575,000 April 1. The company has $10,000,000 of preferred stock outstanding and 800,000 shares of non-par value common.

Receiver for Defiance Company

The Defiance Machine Works, Defiance, Ohio, has been placed in the hands of a receiver as a result of proceedings brought in the Federal Court in Toledo by the Chicago Screw Co., acting for itself and other creditors. E. M. Hammer, manager of the company, was named receiver. The complaint states that the company had a number of machinery orders amounting to about $1,000,000, but that the business depression resulted in a cancellation of many of these orders, leaving the company with large inventories and claims against other companies in financial troubles on which it could not realize. It further stated that the machine works has assets largely in excess of its debts.

Superior Steel Report

The annual report of the Superior Steel Corporation for 1921 shows a net loss, after all expenses and depreciation, of $273,395. In 1920 the company showed profits, after all expenses, depreciation, inventory adjustments and Federal taxes, amounting to $1,022,820. The operations for last year showed a deficit, after sinking fund and dividend requirements, amounting to $1,115,373, as compared with a surplus of $205,547 in 1920.

Gulf States Steel Loss

The report of the Gulf States Steel Co. for the year ended Dec. 31, 1921, shows a deficit after expenses, charges, and dividends of $731,915. This compares with a surplus of $606,174 in 1920.

The income account compares as follows:

	1921	1920
Gross loss	$242,921	*$1,153,089
Depreciation Federal tax	348,915	401,869
Net loss	591,915	*751,229
First preferred dividend	140,000	140,000
Second preferred dividend	.....	5,046
Deficit	731,915	†606,174

*Profit. †Surplus.

The Underpinning & Foundation Co., 290 Broadway, New York, has acquired land in the Degnon Terminal district, Brooklyn, totaling 77,500 sq. ft., for the erection of a three-story plant to manufacture special tools and instruments.

TRADE CHANGES

The headquarters of the American Supply & Machinery Manufacturers' Association is now located in the Gotham National Bank Building, 1819 Broadway, New York.

The Detroit offices of the Trumbull Steel Co., Warren, Ohio, have been moved from the fifth to the tenth floor of the Ford Building. The new office numbers are 1010-11-12. W. J. Hanna is district manager, with headquarters in Detroit.

The Orton & Steinbrenner Co., Chicago and Huntington, manufacturer of locomotive cranes, clam shell and orange peel buckets and coal crushers, has made arrangements with J. Ross Bates, formerly connected with Wonham Bates & Boode Trading Corporation of New York and Boston, to represent it in the New England States and New York. Mr. Bates has offices at 136 Liberty Street, New York, and 128 School Street, Watertown, Mass.

The Diamond soot blower business has been purchased by new interests in the form of the Diamond Power Specialty Corporation of Detroit, a new company which has taken over the business and plant of the Diamond Power Specialty Co., a copartnership, the members of which are retiring from the soot blower business in the Western Hemisphere.

The C. W. Hunt Co., Inc., West New Brighton, S. I., announces the re-establishment of its New York office at 143 Liberty Street. It has taken over all the sales and engineering work which has heretofore been carried on by its subsidiary company, the C. W. Hunt Engineering Corporation, for the past 18 months, as the business of this latter corporation has now been consolidated with the C. W. Hunt Co., Inc.

The Barto-Phillips Co., Inc., engineer and builder, formerly located at 280 Madison Avenue, New York, has removed offices to 52 Vanderbilt Avenue, New York.

The Aluminum Die Casting Corporation is a successor to the Acme Die Casting Corporation, New York. The business will be moved to Garwood, N. J., on or about May 1.

Gropler Brothers, representing manufacturers of metal cutting tools, will be located at 16-22 Hudson Street, New York, after April 1. They have a separate sales organization selling to jobbers and dealers only.

The Tool Sales Co. announces that after April 1 its new address will be the Hudson-Reade Building, New York. It sells tools and specialties to the hardware and automobile supply trade, and would be glad to hear from manufacturers desiring sales service in the metropolitan district.

The Mitchell Specialty Co., Philadelphia, manufacturer of automobile body hardware, announces the reorganization of the company and the election of J. H. Mitchell to the office of general manager and treasurer. Mr. Mitchell brings to his new connection years of experience as a successful executive in organization and finance. The officers are: E. R. Mitchell, president; J. H. Mitchell, treasurer and general manager; J. J. Seitz, vice-president and manager of production.

The Shelton Tool & Machine Co., 235 Canal Street, Shelton, Conn., has voted to change the name to the Shelton Cutlery Co. The personnel of the firm remains the same.

Plans of New Companies

The Auto Trimmers Supply Co. and Iron Products Co., both Michigan corporations, were absorbed by the S. L. Jackson Co., incorporated for $100,000 with $75,000 paid in. Officers are as follows: S. L. Jackson, president and general manager; J. D. Burke, vice-president; F. L. Sutherland, secretary and treasurer. The location of the office and warehouse is 500 to 516 Congress Street, West, Detroit. The company handles a complete line of automobile upholstery and top materials, automobile top and body hardware and also everything in the way of cap screws, semi-finished nuts, bolts, washers, woodscrews, etc.

Handley Brothers, Inc., buffer and plater, 82 Myrtle Street, Meriden, Conn., recently incorporated, has organized with the election of George Handley, as president; John Handley, as secretary and treasurer. Directors are the two above mentioned, and F. V. and N. Handley. The business was formerly carried on as Handley Brothers at the same address.

The A. C. Chesley Co., 704 East 133d Street, New York, manufacturer of hollow metal and metal-covered fireproof doors, sash, etc., is taking bids for the erection of an addition to its plant. P. J. Murray, Tuckahoe, N. Y., is architect.

Machinery Markets and News of the Works

LARGE CRANE ORDER IS PLACED

Wheeling Steel Corporation Buys 21 for Its Various Plants

Improvement in Machine-Tool Orders and Prospects Is Noted in Some Markets

The Wheeling Steel Corporation, Wheeling, W. Va., has placed an order with the Morgan Engineering Co. for 21 cranes for its various steel plants, the largest order of its kind since the war. The crane business shows more life than the machine-tool trade, and there is a number of very promising prospects. The Steel Corporation has obtained prices for estimating purposes on 35 cranes and other steel companies in the Pittsburgh district which contemplate plant improvements are also expected to come into the market soon.

In machine tools a moderate degree of improvement is reported from Chicago, Cleveland and Cincinnati, but in New York and New England conditions are substantially unchanged. Large industrial companies are conspicuous in their absence from the market, and the bulk of the buying is being done by small or intermediate companies. Orders and inquiries are largely for single tools and a considerable share of the activity in all markets is in used tools.

Two promising prospects in the Cleveland district are noted, one inquiry from a Cleveland manufacturer calling for $100,000 worth of tools for a new line of products, while an inquiry from a neighboring State covers 25 new or used machines.

In Chicago the demand for tools is slowly expanding. Railroads are doing practically no buying against recent inquiries. The Santa Fe is expected to put out additional inquiries for tools for a proposed boiler shop at Albuquerque, N. M. About $50,000 worth of machine tools and allied equipment was destroyed in the recent Chicago fire and several of the companies whose shops were destroyed or damaged are looking for machinery for replacement.

The H. H. Franklin Mfg. Co., Syracuse, N. Y., has bought tools for the manufacture of its new four-cylinder car and is expected to close shortly on 14 drilling machines. Two boring machines were bought of a Cleveland builder. The Universal Portland Cement Co., Chicago, is understood to have bought some of the tools it recently inquired for. The Ward Baking Co., New York, has bought against a recent list to equip a motor truck shop.

In foundry equipment an outstanding order is that placed by the Ford Motor Co., covering 72 tumbling barrels for its River Rouge, Mich., plant. The company is also in the market for nine foundry cupolas.

New York

NEW YORK, March 21.

The local machine-tool market continues very dull. Scarcely any business is being placed except in used tools. The Ward Baking Co., New York, is reported to have bought most of the tools for which it recently inquired, the equipment being for a motor truck shop.

An export company is in the market for two tool room lathes for Japan.

Activity in cranes the past week centered about the placing of several inquiries for overhead cranes that have been pending for some time. At present inquiries for large cranes seem to predominate. Bidding has practically been closed on the 110-ton power house crane for the West Penn Power Co., Pittsburgh, being purchased by Sanderson & Porter, 25 William Street, New York. Estimates were recently requested by the Foundation Co., 120 Liberty Street, New York, on a 150-ton power house crane, but it is not expected that purchase will be made for some time. Bids are also being submitted by about seven crane builders on another 150-ton overhead traveling crane. C. L. Cadle, superintendent of public works, Albany, N. Y., is receiving bids until April 11, on contract 122, calling for two 5-ton electric gantry cranes for the Barge Canal terminals at Syracuse and Rochester, N. Y.

Among recent purchases are: Stone & Webster for Flat Rock, Mich., a 10-ton, 18-ft. 10-in. span and 15-ton, 33-ft. 8-in. span, overhead traveling cranes; the Flockhart Foundry, Newark, N. J., a 5-ton, 50-ft. span, overhead traveling crane, and Russell, Birdsall & Ward, Portchester, N. Y., two 2-ton, 58-ft. 6-in. span, overhead traveling cranes from the Pawling & Harnischfeger Co.; F. L. Smidth & Co., 50 Church Street, New York, for the Glens Falls-Portland Cement Co., Glens Falls, N. Y., a 10-ton, 65-ft. span bucket crane with 3-yd. Hayward bucket from the Cleveland Crane & Engineering Co., and M. W. Kellogg & Co., Jersey City, N. J., a 15-ton, 61-ft. span, 3-motor, overhead traveling crane from the Niles-Bement-Pond Co.; International Trading Corporation, 60 Broadway, New York, two 30-ton locomotive cranes for the Imperial Government Railways, Japan, from the Industrial Works.

Edward V. Galen, 14 Irving Place, New York, desires information and prices regarding belt-driven bench grinding heads, equipped with tool rests, chisel holder, drill and shear grinding guides; also taper shank for buffing and polishing work; size of wheels desired to use 6 to 8 in. diameter, 1 to 1½-in. face.

The International Nickel Co., New York, has decided to discontinue certain of its manufacturing operations at its Bayonne, N. J., plant, and some of the equipment there is being shipped to its new plant at Huntington, W. Va., and some to the Canadian plant. A part of the equipment is to be offered for sale.

The Barnet Weinstein Iron Works, 53 Boerum Street, Brooklyn, has awarded a contract to Levering & Garrigues, 552 West Twenty-third Street, New York, for a two-story building at Stewart and Meserole avenues, Brooklyn, 100 x 280 ft., to cost about $65,000.

A four-story cold storage and refrigerating plant to cost $200,000, with equipment, will be constructed by the Brooklyn, N. Y., Retail Butchers' Corporation, care of Henschien & McLaren, 1637 South Prairie Avenue, Chicago, architects.

Parker Axles, Inc., Fifteenth Floor, Gotham National Bank Building, Broadway and Fifty-ninth Street, New York, manufacturer of automobile axles, has awarded contract to H. K. Ferguson, 25 West Forty-third Street, for a one and two-story plant at Poughkeepsie, N. Y., 100 x 160 ft.

Bids are being taken until April 4 by the Bureau of Supplies and Accounts, Navy Department, Washington, for a 100-hp. vertical fire tube boiler for use at the Brooklyn Navy Yard.

The Municipal Gas Co., Albany, N. Y., furnishing electrical service in this district, is planning for extensions and improvements in its power house and electrical system to cost $955,000, including new equipment. Application has been filed with the Public Service Commission for permission to issue bonds in this amount and carry out the work.

The L. E. Lynd Mfg. Co., Canal Street, Mechanicsville, N. Y., manufacturer of hardware and other metal products, is having plans prepared for rebuilding its three-story factory, 70 x 90 ft., recently partially destroyed by fire.

The Watertown Battery & Electric Co., 1313 State Street, Watertown, N. Y., is planning for the installation of

new equipment for the manufacture of electric storage batteries and other electrical products.

The Savage Arms Corporation, 50 Church Street, New York, with plants at Utica, N. Y., and Pittsburgh, for the manufacture of firearms and ammunition, is arranging to manufacture a line of refrigerating machinery and electric washing machines and parts. One or both of the plants will be converted, in part, to accommodate the new branch of manufacture. The company recently took over the former plant of the Westinghouse Electric & Mfg. Co., at Chicopee, Mass.

The Eastern Malleable Iron Co., Naugatuck, Conn., has plans under way for a one-story foundry at Watervliet, N. Y., 50 x 250 ft.

W. W. Farley, 79 Chapel Street, Albany, N. Y., has had plans prepared for a three-story automobile machine and service works, 75 x 122 ft., at Chapel and Orange streets, estimated to cost $100,000 with equipment. H. Rogers, 443 Broadway, Albany, is architect.

A vocational department will be installed in the two-story high school, 160 x 230 ft., to be erected at Elmira, N. Y., for which bonds for $550,000 have been voted. Pierce & Bickford, 118 Lake Street, are architects.

The Sinclair Consolidated Oil Corporation, 45 Nassau Street, New York, has disposed of a bond issue of $45,000,000, the proceeds to be used in part for plant acquisitions, extensions and improvements. During the past twenty-four months the company has expended about $60,000,000 in plant and expansion work.

The Port Jefferson Shipyard Corporation, Port Jefferson, L. I., has taken title to the local plant of the New York Harbor Dry Dock Corporation for $168,000. The new owner will operate the yard for building merchant vessels and for repair work.

Through Kuhn, Loeb & Co., 52 William Street, New York, bankers, the Paris-Lyons-Mediterranean Railroad Co., Paris, France, is disposing of a bond issue of $30,000,000, the proceeds to be used for the electrification of certain sections of the system, power plants and equipment, new rolling stock, shops and machinery, and other extensions and improvements.

The Deep Drawn Metal Corporation, 30 Church Street, New York, has acquired the three-story factory at 61-67 Navy Street, Brooklyn, for a local plant. It is now operating a factory at 195 Plymouth Street.

A vocational department will be installed in the two-story high school to be erected at Bridgeton, N. J., estimated to cost about $225,000. Ritter & Shay, North American Building, Philadelphia, are architects.

Fire, March 15, destroyed the plant of the Fischer-Sweeny Bronze Co., 1301-11 Grand Street, Hoboken, N. J., manufacturer of bronze, aluminum and other metal castings, with loss estimated at $200,000, including equipment.

A vocational department will be installed in the three-story high school to be erected at Clifton, N. J., estimated to cost $750,000. H. Barrett Crosby, 125 Ellison Street, Paterson, N. J., is architect.

An ice-manufacturing and refrigerating plant will be erected by the Montclair Rink & Ice Co., care of George W. Backoff, 9 Clinton Street, Newark, N. J., architect, to be used in connection with a skating rink, 125 x 350 ft., estimated to cost $200,000.

Effective with the closing of the foundry and machine shop of the Bethlehem Shipbuilding Corporation, at Redington, Pa., April 1, the company will transfer all of this work to its Moore plant at Elizabeth, N. J. The production will include pumps, fittings and kindred equipment, for use at all of the shipyards of the company.

Philip Woolf, 50 Columbia Street, Newark, N. J., manufacturing jeweler, has had plans prepared for a new factory, 25 x 85 ft., at 412 South Twelfth Street. Nathan Siegler, 164 Market Street, is architect.

Buffalo

BUFFALO, March 20.

C. L. Cadle, superintendent of Public Works, Albany, N. Y., will take bids until April 11 for two 5-ton electric gantry cranes for the Barge Canal Terminals at Rochester and Syracuse, N. Y., respectively.

The Malone Light & Power Co., Malone, N. Y., has filed application for permission to build new electric power plants at Dickinson and Waverly for light and power service in these districts.

The Board of Education, Boonville, N. Y., will purchase machine tools and other mechanical equipment for installation in the manual training department at the high school.

The A. & J. Mfg. Co., Water Street, Binghamton, N. Y., manufacturer of wire goods, is planning for the erection of an addition, 60 x 120 ft., at Water and Eldredge streets, to cost about $45,000. E. H. Johnson is president.

The Lang Mfg. Co., Olean, N. Y., recently organized, is planning for the establishment of a factory to manufacture a re-winding machine for motion picture service and other kindred equipment. Carl Lang, Olean, inventor of the machine, is president of the company.

A one-story power house addition will be erected by the Board of Directors of the City Hospital, South Quarry Street, Ithaca, N. Y.

An appropriation of $4,500,000 has been made by the City Council, Buffalo, for a new filtration plant, to include electrically-operated pumping plant, filtering machinery and other equipment. George D. Andrews, City Hall, is city water commissioner. Clark D. Parsons is engineer for the Department of Public Works.

G. F. Hausner, 939 Northampton Street, Buffalo, is planning for the installation of new sheet-metal working machinery at his factory.

A vocational department will be installed in the new high school to be erected by the Salina School District, Liverpool, N. Y., estimated to cost $150,000, to replace the present school on Second Street. M. D. Green, Liverpool, is in charge.

A cold storage and refrigerating plant will be installed at the Gowanda State Homeopathic Hospital, Collins, N. Y., by the State Hospital Commission, Albany. Lewis F. Pilcher, Capitol Building, Albany, is State architect.

The Acme Cylinder Grinding Co., Rome, N. Y., is planning for the installation of new grinding and other equipment. M. J. Kernan is head.

The City Council, Batavia, N. Y., has called a special election on April 6 to vote bonds for $450,000 for the erection of a three-story high school with vocational department, 145 x 200 ft. E. E. Joralemon, 482 Delaware Avenue, Buffalo, is architect.

Benjamin Spielberg, 28 Brinkerhoff Street, Plattsburg, N. Y., has plans under way for a new two-story machine shop, 60 x 90 ft.

The Northern New York Utilities, Inc., 58 Public Square, Watertown, N. Y., will soon break ground for a hydroelectric generating plant at Browns Falls, near Watertown, to cost about $100,000.

Philadelphia

PHILADELPHIA, March 20.

The Pennsylvania Equipment Co., 1420 Chestnut Street, Philadelphia, is in the market for a second-hand passenger coach with rattan seats, suitable for workmen's train; also a second-hand, standard gage, four-driver, saddle tank locomotive, weight 50 tons.

The U. M. C. Garage, Fifteenth and Locust streets, Philadelphia, has completed plans for a three-story repair and service building, 70 x 115 ft., to cost about $125,000, including equipment. The Hoffman-Henon Co., Finance Building, is architect.

The Philadelphia Electric Co., Tenth and Chestnut streets, Philadelphia, Pa., will install electric power equipment for the municipal rapid transit system, including cables, controls, transformers, substation apparatus, etc., to cost $150,000. It will soon commence the erection of an addition to its generating plant at Beach and Palmer streets for the installation of a new 30,000-kw. generator and auxiliary equipment.

The Electric Foundry & Equipment Co., Tacony and Bleigh streets, Philadelphia, is arranging for the installation of electric furnaces, cranes and other equipment at its new plant, now in course of erection, to be used primarily for the production of steel castings. William P. Cunningham is president.

The John T. Lewis & Brothers Co., Lafayette Building, Philadelphia, will soon commence the erection of the superstructure for a two-story power house, 63 x 77 ft., at its paint manufacturing plant, to cost $60,000. E. F. Beale is president.

The Douglas Mfg. Co., Philadelphia, manufacturing jeweler, has leased a floor in the new building at 45-47 North Eighth Street. Precision equipment, bench tools, etc., will be installed at once.

The Gulf Refining Co., Widener Building, Philadelphia, has purchased 70 acres in the vicinity of Girard Point, for extensions in its oil distributing works, to include pumping equipment, tanks, mechanical buildings, etc.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until April 4 for one motor-driven precision bench lathe, one motor-driven emery grinder, one motor-driven watchmakers' lathe, one set of watch-

makers' tools, and one gage testing outfit, as specified in schedule 9522, for use at the Philadelphia Navy Yard.

Joseph Kalter, 1621 Ridge Street, Philadelphia, manufacturer of lighting fixtures, is planning for the installation of new lathes and other machine tools at his factory.

The Quaker City Cold Storage Co., 301 Delaware Avenue, Philadelphia, is perfecting arrangements for a one-story cold storage and refrigerating plant, 27 x 125 ft., on South Delaware Avenue, to cost about $75,000.

The Commissioner of Education, State House, Trenton, N. J., is taking bids until March 28 for a power house and pumping plant at the New Jersey School for the Deaf, Trenton Junction. Arnold H. Moses, Temple Building, Camden, N. J., is architect.

George Shearman, 119 Pennsylvania Avenue, Atlantic City, N. J., has filed plans for the erection of a one-story machine shop, 35 x 66 ft. Haining & Palliser, Guarantee Trust Building, are architects.

The Sun Shipbuilding Corporation, Chester, Pa., has secured the exclusive rights of manufacture in this country of opposed piston Diesel oil engines, secured under British patents by Doxford & Sons, shipbuilders, England. Plant arrangements will be made for the manufacture of the new engine units and parts.

The Danville Iron & Steel Co., Danville, Pa., is planning for the erection of a new foundry in the spring. It manufactures machinery and parts.

A new power house, 100 x 130 ft., to cost about $150,000 with equipment, will be erected by the Scranton Lace Co., Albright Avenue, Scranton, Pa. Lockwood, Greene & Co., 101 Park Avenue, New York, are engineers.

The Luzerne County Gas & Electric Co., Plymouth, Pa., has arranged for a bond issue of $1,000,000, a portion of the proceeds to be used for extensions and improvements in its power plant and system.

The Forbes Aluminum Products Co., Steele Building, Easton, Pa., will soon break ground for its new plant in the South Side section, estimated to cost about $150,000 with machinery. A. D. Chidsey, Jr., 341 Northampton Street, Easton, is architect. Ewing W. Forbes is president.

A vocational department will be installed in the new high school to be erected at Glenolden, Pa. Clarence W. Brazer, Crozer Building, Chester, Pa., architect, has been commissioned to prepare plans.

The Glen Rock Electric Light & Power Co., Glen Rock, Pa., has acquired the plant of the Deer Creek Light & Power Co., at Shrewsbury, Pa., and in the future will furnish service in this district. Extensions will be made to the present station and additional equipment installed.

A one-story machine shop will be constructed by the Arbogast & Bastian Co., Front and Hamilton streets, Allentown, Pa., in connection with extensions to its meat-packing plant. An addition will be built to the cold storage and refrigerating plant and new equipment installed.

A vocational department will be installed in the two-story and basement high school to be constructed by the Haverford Township School District, at Oakmont, Pa., 170 x 245 ft., to cost $300,000. Boyd, Abel & Gugert, Estey Building, Philadelphia, are architects, and J. W. Huff, 6035 Lansdowne Avenue, Philadelphia, is secretary.

The Semple Rubber Co., Trenton, N. J., manufacturer of inner tubes, has purchased the factory property on Murray Street, comprising a number of brick buildings, for $40,000.

The Board of Directors, State Normal School, Slippery Rock, Pa., will take bids early in April for the erection of a two-story refrigerating plant at the institution.

The Martin-Parry Corporation, York, Pa., manufacturer of automobile bodies, is perfecting plans for new works at Lumberton, Miss., for assembling and finishing automobile body base and top units. A complete saw mill and cutting up plant will be constructed in the same district by the Edward Hines Lumber Co., 2431 South Lincoln Street, Chicago, which has taken a contract for material from the Martin-Parry company.

Cincinnati

CINCINNATI, March 20.

An improved tone to the machinery market was noted by a number of manufacturers the past week. Orders placed, however, were still at a very low point, the better feeling coming as a result of the complexion of the inquiries received. A local manufacturer who recently visited many dealers in new and second-hand equipment in the East, has returned to the city filled with optimism regarding the future. From his observations it would appear as though the number of used machine tools in good condition is diminishing rapidly and that prices are much firmer than they have been for some time. He reports having been able to place orders for 13 machines with dealers in the East. Some fair sized orders were closed during the week. A Dayton manufacturer is said to have placed an order with a Cleveland machine tool builder for turret lathes and automatic screw machines. The Wheeling Steel Corporation, in addition to placing an order for 21 cranes with the Morgan Engineering Co., is also said to have secured the machine tools recently inquired for, practically all of the machines being used tools. The Universal Portland Cement Co., has also closed on several tools. It is understood here that the Rock Island Railroad has decided to defer its purchases of machine tools for the present. A deal involving five machines is reported by a local manufacturer, but this is more or less in the nature of a trade—used machines being taken as part payment in exchange for new ones.

One of the 54-ft., 220,000-volt snow-type steel towers, built by the Pacific Coast Steel Co. for use on the Pitt River line of the Pacific Gas & Electric Co. was installed in the Municipal Auditorium, San Francisco, at the California Industries Exposition. In the base of the tower was built a small booth representing an electrical kitchen. Around the outside were placed a number of small trees, the idea being to indicate that the tower was standing in a forest.

The J. A. Fay & Egan Co., Cincinnati, manufacturer of wood-working machinery, is having plans prepared for its new plant in the Bond Hill section, building operations to be under way within three or four months.

The Pioneer Auto Heater Co., Cincinnati, has been incorporated with a capitalization of $50,000 to manufacture automobile heaters and other accessories. Its plant will be located at 2682 Madison Road and will be operated in connection with the tool business now being conducted by the Scott-Spencer Automatic Tool Co. T. J. Scott is president.

Officials of the American Laundry Machinery Co., Cincinnati, have issued a denial of the report that the company is to be amalgamated with the U. S. Hoffman Machinery Co., Syracuse, N. Y. The report originated through the fact that the Laundry company has granted rights to the Hoffman company to use certain of its patents.

Fire at the plant of the William Hamilton Sons Car Co., Newark, Ohio, on March 11 destroyed the boiler and engine room, with loss of approximately $30,000. The power plant will be rebuilt at once.

Chicago

CHICAGO, March 20.

Demand is slowly expanding and it is notable that orders are principally for one or two tools and are coming from miscellaneous sources. The larger industrial companies are conspicuous for their absence from the market and the railroads have done practically no buying against the inquiries they have been issuing from time to time. The Santa Fe, which is regarded as the most likely to buy of any of the local railroads, is expected to put out an additional list covering the needs for a proposed boiler shop at Albuquerque, N. M. The Western Clock Co., LaSalle, Ill., which, as noted a week ago, placed an order for 24 automatic screw machines, has also bought one 14-in. x 6-ft. and one 16-in. x 6-ft. geared head motor-driven engine lathe, a geared head motor-driven 26-in. shaper, and three bench lathes with slide rests.

The disastrous fire which on March 14 destroyed the block bounded by Clinton and Canal streets, Jackson Boulevard, and the Metropolitan Elevated Railroad tracks, wiped out the shops of a number of companies which have already taken steps to replace their equipment. It is estimated that close to $50,000 worth of machine tool equipment was destroyed. Among the companies which are now in the market as the result of the conflagration are the Monarch Mfg. Co., manufacturer of automobile specialties, Krone Sebek & Co., maker of die casting equipment and tools, the Utility Tool & Die Works, the Superior Tool Co., the Merkle-Korff Gear Co., manufacturer of can wrapping machinery and gears, and the U. & J. Carburetor Co.

The Great Northern Railroad, St. Paul, F. A. Bushnell, purchasing agent, has sent out inquiries for the following shop equipment:

One 400-ton full hydro-pneumatic 52-in. car wheel press including 7½-hp. motor, 3 phase, 60 cycles, 440 volts complete with starter having overload and no voltage release, also one recording gage.

One 42-in. Bullard (or similar) vertical turret boring mill, direct connected to and including 15-hp., 60 cycle, 3 phase, 440 volt motor and starter.

One set standard tool equipment for above mill.

One 36-in. heavy duty upright common drill press. Spindle to have No. 5 Morse taper including motor and starter of 60 cycle, 3 phase, 440 volts.

One 30-in. Lodge & Shipley (or similar) 7 ft. between centers, selective head and taper attachment, high duty lathe, direct connected to and including suitable motor and starter of 60 cycle, 3 phase, 440 volts, including four-jaw independent chuck and full set of tool holders.

One 600-ton full hydro-pneumatic, slanting head, driving-wheel press with 13-in. throat, direct connected to and including one 15-hp. 60 cycle, 3 phase, 440 volt motor and starter.

One throatless shear to be direct connected to and including suitable motor of 60 cycle, 3 phase, 440 volt characteristics and starter, to have a capacity to shear 3/16-in. sheet steel.

Two pneumatic riveting hammers suitable for driving ½-in. rivets.

One 1½-in. Acme double head bolt cutter (or equal) to be direct connected if possible and driven by suitable 440 volt, 60 cycle, 3 phase squirrel cage induction motor with starter, to be furnished with full set of dies.

One Oster pipe threading machine (or equal) to cut pipe from ¼-in. to 2 in. direct connected to and driven by suitable squirrel cage induction motor of 440 volts, 3 phase, 60 cycle with starter to be furnished with full set of dies.

One Webber crank pin turning tool.

One No. 5 Landis (or equal) cylinder grinding machine capable of grinding cylinders from 3 in. to 8 in. to be belt driven and including counter shaft and grinding wheels.

One 15-hp. 60 cycle, 3 phase, 440 volt squirrel cage induction motor with starter.

One 30-in. Lodge & Shipley selective head lathe 7 ft. between centers (or equal) to be direct connected to suitable squirrel cage induction motor of 440 volt, 3 phase, 60 cycles with starter and one 18-in. four-jaw independent chuck and full set of 10 Armstrong tool holders to suit lathe to be furnished with taper attachment.

The Great Northern Railroad Co., Railroad Building, St. Paul, Minn., has plans nearing completion for the construction of a new one-story car repair shop, 84 x 300 ft., at Minot, N. D., to cost about $50,000. A. H. Hogeland is chief engineer.

The Ford Motor Co. has placed orders for 72 tumbling barrels for its River Rouge, Mich., plant, 36 each being placed with the Whiting Corporation and the W. W. Sly Mfg. Co. The Ford company is also in the market for nine cupolas.

The U. S. Sample Co., printer, 801 South Wells Street, Chicago, is receiving bids through Alfred S. Alschuler, 28 East Jackson Boulevard, on a six-story printing plant, 125 x 125 ft., at Jackson Boulevard and Laflin Street, to cost $300,000.

Alfred S. Alschuler, architect, 28 East Jackson Boulevard, Chicago, has let contracts for a three-story automobile salesroom and service station, 100 x 390 ft., on Michigan Avenue between Twenty-second and Twenty-third streets, for the Hudson Motor Car Co.

The Paasche Air Brush Co., 1219 West Washington Boulevard, Chicago, has let a contract through Frank D. Chase, Inc., architect, for a two-story factory, 106 x 125 ft., at 1909-15 Diversey Parkway, to cost $100,000.

Holton, Seelye & Co., builders, 140 South Dearborn Street, Chicago, have let contract for a one-story factory for the manufacture of jewelers' boxes, at 4431-43 West Lake Street, to cost $18,000.

The construction of two units of the new Cadillac Malleable Iron Co. plant, Cadillac, Mich., is expected to start soon. The foundry will be ready to commence operations by the middle of the summer, it is hoped.

Elmer Moore has opened a general machine shop and garage at 518 Erie Street, Storm Lake, Iowa.

The Automatic Traffic Regulator Co., Inc., Andrews Building, 163 West Washington Street, Chicago, recently organized to manufacture an automatic traffic signal or regulator to take the place of the human signal at street intersections, is letting its manufacturing work by contract for the present. The officers are R. E. Blick, president; P. A. Baulsir, treasurer, and F. C. Hawkins, secretary.

Forbes-Babcock, Inc., 4113 West Irving Park Boulevard, Chicago, recently incorporated with $5,000 capital stock, will engage in the manufacture of radio telephone receiving sets complete. Factory space will probably be leased and it has not yet been decided whether machines will be manufactured or assembled. The officers are Allan C. Forbes, president; Samuel Rubinkam, vice-president and Robert S. Babcock, secretary-treasurer.

The Universal Electric Sign Co., 4854 West Kinzie Street, Chicago, has been incorporated with $12,000 capital stock to manufacture electric signs. It has leased a plant, 60 x 90 ft., at the above address and has purchased the needed metal-working machinery. The officers are R. I. O'Connor, president; S. M. Moses, vice-president; and G. Thompson, Jr., secretary-treasurer.

V. B. and V. L. Parker have purchased and taken possession of the Howard Brothers Sheet Metal Co.'s business at 713 West State Street, Rockford, Ill. They will remodel the plant and do all kinds of sheet metal and furnace work.

The Pope Machine Co., Kankakee, Ill., has been incorporated to manufacture textile machinery. T. W. Prosser, superintendent Paramount Hosiery Form Drying Co., Kankakee, is a stockholder. No announcement of the immediate plans of the company has been made.

G. J. Kramer, 487 Aurora Avenue, St. Paul, Minn., has taken bids on a one-story garage, 125 x 127 ft., at University and Farrington avenues, to cost $40,000.

The Ster-o-Lock Mfg. Co., 417 South Dearborn Street, Chicago, has been incorporated with $50,000 capital stock to manufacture automobile accessories and machine shop equipment and has equipped a plant for manufacturing operations. The officers are Bertram W. Coltman, president; Joseph E. Krass, secretary and general manager, and Edward J. Krass, treasurer.

The National Stamping & Electrical Works, 424 South Clinton Street, Chicago, has awarded contract to McKeown Brothers, 112 West Adams Street, for a new one-story plant 3238-50 West Lake Street, 130 x 150 ft., estimated to cost about $60,000.

C. R. Berglund, 2630 Wentworth Avenue, Chicago, is taking bids on a general contract for a one-story plant, 100 x 125 ft., at South Park Avenue and Sixty-seventh Street, to manufacture automobile bodies. It will cost about $45,000 with equipment.

A vocational department will be installed in the two-story high school to be erected by the Board of Education, Waseca, Minn., estimated to cost $200,000. C. H. Bailer is clerk of the board.

The Red River Power Co., 27 South Third Street, Grand Forks, N. D., is planning for extensions and improvements in its electric power plant and system to cost about $130,000, including machinery. A new turbine unit will be installed. W. G. Brown is general manager.

Fire, March 9, destroyed a portion of the plant of the

Incorporated Ready Roofing Co., Forty-fourth and La Salle streets, Chicago, manufacturer of roofing products, with loss estimated at about $45,000, including equipment.

The Illinois Oil Co., Rock Island, Ill., has plans under way for a new three-story plant, 40 x 150 ft., estimated to cost about $165,000, including equipment. Cervine & Burt, 310 Safety Building, are architects. F. J. Welsh is president.

The Gopher Machinery Co., New Prague, Minn., will install an electric traveling crane at its new plant, 80 x 100 ft., estimated to cost $50,000, plans for which are being prepared by J. C. Niemeyer, 643 Endicott Building, St. Paul, Minn.

The Elgin & Marengo Railroad Co., Marengo, Ill., has plans for a new electric power plant, 45 x 105 ft., and will proceed with the work at once.

The Board of Water and Light Commissioners, Austin, Minn., has plans in progress for a new electric power plant for municipal service, 60 x 80 ft., comprising in part the rebuilding of a former station, estimated to cost about $100,000, including equipment. A. L. Pillsbury, 1200 Second Avenue, South Minneapolis, Minn., is engineer. William Todd is superintendent for the board.

The Rozum Motor Co., 400 East Fourth Street, Mitchell, S. D., is planning for the erection of a two-story repair and service works at Fifth Avenue and Main Street, to cost approximately $50,000. A. J. Rozum is head.

New England

BOSTON, March 20.

Machine tool orders the past week were practically at a standstill, a few individual low-priced machines furnishing most of the business. Considerable looking about in the used machinery market by prospective customers is noted, but actual sales are few and far between. One Massachusetts municipality is expected to close within a few days on three South Bend lathes and a shaper, which will constitute the largest sales for the week in this district. Stone & Webster, Boston, have purchased a 15-ton Western made crane, with 33-ft. span and three motors, for a Ford, Flat Rock, Mich., project.

Machine-tool manufacturers are beginning to circulate among shops in New England to get views of users as to how their metal-working equipment can be improved for certain kinds of work. Screw machine representatives report little inquiry for machines but a decided improvement in the demand for screw machine products, especially from automotive equipment manufacturers.

Plans are being drawn for a one-story locomotive repair shop for the Boston & Maine Railroad at Concord, N. H. The estimated cost is $307,900.

Frank Perrone, 9 Boardman Street, East Boston, contemplates the construction of a one-story, 75 x 150 ft. garage and service station on Bennington Street to cost $40,000. Plans are being drawn.

Bids are being asked on a two-story and basement factory, 82 x 113 ft., by the New England Machine & Electric Co., 31 Bagley Street, Pawtucket, R. I.

The old casting shop, Torrington, Conn., formerly owned by the American Brass Co., is being razed to make way for a new rolling mill, to be erected by the Anaconda Copper Co., which recently acquired the American Brass Co.

The Bush Mfg. Co., Hartford, Conn., truck, tractor and airplane radiators, will erect a one-story, 50 x 250 ft. plant on Wellington Street at an estimated cost of $40,700.

The Stamford Foundry Co., 115 Canal Street, Stamford, Conn., stove manufacturer, is having plans drawn for an addition and other improvements. Emmens & Abbott, Washington Building, Stamford, are the architects.

The Vaast Brothers Garage & Taxicab Co., 17 Chestnut Street, South Norwalk, Conn., are planning to erect a garage and repair shop, two stories, about 80 ft. sq.

Bids will be opened in Washington about April 15 by the Bureau of Yards and Docks, Navy Department, for the construction and equipment at the South Boston Navy Yard of a substation, distributing system and first aid station, as provided in specification No. 4550. The work will involve about $100,000 and will call for the erection of an annex to the pump house to conform to the present building. The equipment will include a three-unit motor generator set, 250-kw., 2300-volt, alternating current to 140-volt direct current; a 2300-volt alternating current to 250-volt direct current, an exciter set and a nine-panel switchboard, together with accessories. It had been erroneously published that the bureau was planning for a new dry dock and power house at the South Boston yard.

The Gilbert & Bennett Mfg. Co., Georgetown, Conn., manufacturer of wire cloth and other wire goods, has completed plans for a three-story and basement addition, 50 x 150 ft. Greenwood & Noerr, 847 Main Street, Hartford, Conn., are engineers. It will also build a one-story addition to its plant at Wireton, near Blue Island, Ill., 25 x 125 ft., estimated to cost about $25,000. L. G. Hallberg & Co., 116 South Michigan Avenue, Chicago, architects, will prepare plans for the latter work.

A two-story power plant, 45 x 60 ft., and one-story machine shop, 25 x 45 ft., will be erected by the Colwell Worsted Co., Providence, R. I., in connection with its new plant on Hartford Avenue, for which the general contract has been awarded to the C. I. Bigney Construction Co., 357 Westminster Street.

The Wireless Specialty Apparatus Co., 493 C Street, South Boston, manufacturer of radio equipment, has leased a five-story, reinforced-concrete plant on Atherton Street, Jamaica Plains, Boston, and will remove its present factory to this location in April. About twice the present amount of floor space will be utilized at the new plant.

The Meisel Press Mfg. Co., 944 Dorchester Avenue, Boston, manufacturer of printing presses, screw machine products, etc., has awarded contract to the Tredennick Co., 10 High Street, for a one and two-story addition, 160 x 300 ft., and 40 x 80 ft., to cost about $250,000, including machinery. McNaughton & Cleverdon, 19 Congress Street, are architects.

A one-story power house will be erected by the American Hosiery Co., Park Street, New Britain, Conn., 40 x 50 ft. Motors and other electrical equipment will be installed in different departments of the mill. Reeds & Thorpe, 60 Prospect Street, Hartford, Conn., are engineers.

The Boston Elevated Railway Co., 108 Massachusetts Avenue, Boston, has plans nearing completion for an addition to its power plant on First Street, estimated to cost about $900,000, including machinery. Contract has been awarded to McDonald & Imhof, Roxbury, Mass., for a car inspection shop, 60 x 300 ft., at Forest Hills, estimated to cost about $150,000. The latter building will be supplemented by a one-story car repair shop, 350 x 350 ft., and other mechanical buildings, estimated to cost in excess of $2,000,000. Dwight P. Robinson & Co., 61 Broadway, New York, are engineers.

The W. F. Concannon Shear Co., 42 Depot Street, Milford, Conn., recently organized, is arranging for the establishment of a plant at Bridgeport, Conn., to manufacture steel shears, scissors, etc. William F. Concannon heads the company.

The Union Specialty Co., 138 Hurd Avenue, Bridgeport, Conn., manufacturer of metal products, will soon commence the erection of the superstructure for a two-story and basement plant, 50 x 125 ft., to cost about $50,000.

The W. J. Hyland Mfg. Co., 151-3 Dwight Street, Springfield, Mass., manufacturer of piping, plumbing equipment, etc., will soon break ground for a three-story, brick and steel plant, 48 x 85 ft., on Liberty Street, estimated to cost about $45,000.

Cleveland

CLEVELAND, March 20.

The improvement in demand for machine tools noted earlier in the month continues and sentiment in the trade is more optimistic than it has been for many months. While no round lot sales are reported, dealers are getting a fair volume of single tool orders, the demand being largely for small tools and a considerable share of the activity being in used machinery. A few new inquiries have come out that look promising. One is from a Cleveland company that is considering the purchase of approximately $100,000 worth of equipment for making a new line of products and another is from a company in an adjoining state for about 25 new or used machines.

Manufacturers of turret lathes report that some inquiries which have been pending for several weeks show signs of resulting in orders shortly. A representative of a local manufacturer of drilling machinery, who has just recently made a trip to the railroad shops in the East and South, has returned with a few definite prospects for early sales. The H. H. Franklin Automobile Co., Syracuse, N. Y., is purchasing equipment to manufacture a new four-cylinder motor car. It has placed orders with a Cleveland manufacturer for two boring machines and is expected to purchase 14 drilling machines shortly.

The Wellman-Seaver-Morgan Co., Cleveland, has just taken an order for three hydraulic turbines of 35,000 hp. capacity each for the new Big Creek plant of the Southern California Edison Co., Los Angeles, Cal.

The Zeder Motor Co. has been incorporated and plans to begin the manufacture of the Chrysler motor car at the plant of the Cleveland Tractor Co., Cleveland. The Elizabeth, N. J., plant of the Willys Corporation was equipped for the

manufacture of this car. The Cleveland Tractor Co. will continue the manufacture of farm tractors and it is not known as yet what additional equipment will be required for the manufacture of the motor cars.

Bellefontaine, Ohio, is planning extensions to its municipal power plant which will include a 600-kw. turbo generator unit with additional boiler and condenser capacity and other power plant equipment, involving the expenditure of approximately $91,000. A special election will be held April 4 to secure authority to issue the necessary bonds.

The Lorain Steel Foundry Co., Lorain, Ohio, recently incorporated with a capital stock of $250,000, has taken over the plant of the Aetna Steel Casting Co., Lorain, and is making improvements. W. W. Davidson is president, W. D. Jones, vice-president and secretary and C. M. Hartzell, treasurer and sales manager.

The Fisher Ohio Body Co., Cleveland, has leased the plant of the Briggs Mfg. Co., Cleveland, for additional manufacturing capacity.

Baltimore

BALTIMORE, March 20.

The Universal Heater & Mfg. Co., Charlotte, N. C., is building a plant for the manufacture of heaters, sheet metal work, etc. C. W. Sexton is president.

The Richmond, Va., plant of the Chicago Nipple Co., manufacturer of pipe nipples, etc., has acquired a building at First Avenue and Ninth Street, Baltimore, and will move to that location as soon as necessary alterations can be made. D. C. Williams is president of the company.

The Thornhill Wagon Co., Lynchburg, Va., is in the market for a second-hand vertical reaming or boring machine that will bore tempered cast iron cylinders 2½ x 8 in. to 3½ x 11 in. About 1/16 in. will be cut out of the inside diameter. The company also wants a furnace or cupola to melt one ton of gray iron castings, either blast or electric type.

The Wilmington Sugar Refining Co., Christiana Avenue and B Street, Wilmington, Del., will build a one-story power house, 95x150 ft. W. J. Wayte, Inc., 125 East Forty-sixth Street, New York, is engineer.

The Continental Can Co., Keyser Building, Baltimore, is planning for extensions and improvements in its plant at Highlandtown, to cost about $18,000.

The Empire State Ice Co., Inc., care of William R. Moore, traffic manager, Chamber of Commerce, Cumberland, Md., is arranging for the erection of a new cold storage plant to cost about $400,000, including equipment.

The Mexican Petroleum Corporation, 120 Broadway, New York, will build a new pumping plant and steel tankage distributing works on First Street, Baltimore, to cost about $42,000.

The Natural Abrasive Mining Co. of America, Waynesville, N. C., is planning for a new grinding mill and operating plant at Willets, N. C., estimated to cost about $100,000. The initial works will be extended later, bringing the investment to about $300,000. Frank R. Hewitt is treasurer.

The Western Maryland Railway Co., Baltimore, will construct 75 storage bins at its grain elevator at Port Covington, Baltimore, with conveying and other mechanical equipment and extensions, estimated to cost about $525,000.

The Patuxent Clay Products Co., 210 Equitable Building, Baltimore, has selected a site at Patuxent for the erection of its new plant to manufacture hollow tile, etc., to cost about $100,000, including equipment. I. P. Mills is in charge.

The City Council, Clifton Forge, Va., has arranged for a bond issue of $240,000 for the construction of a municipal electric power plant. Plans will be drawn at once.

A machine and repair shop, with automobile service department, will be constructed by the Salvation Army, 521 Thirteenth Street, N. W., Washington, at its Industrial Home, to cost about $200,000, including equipment. A wire baling department will also be installed.

The Bureau of Yards and Docks, Navy Department, Washington, has completed plans for the superstructure of a new machine shop at Pearl Harbor, H. T., for the local navy yard and will call for bids under specification 4518.

The Sandhill Packing Co., Aberdeen, N. C., is planning for extensions in its plant for the establishment of a department to manufacture tin cans and containers.

The Georgia Railway & Power Co., Atlanta, Ga., has arranged for a bond issue of $150,000, a portion of the proceeds to be used for extensions and improvements in power plant and system.

A vocational department will be installed in the two-story high school to be erected by the Board of Education, Southport, N. C., to cost about $55,000.

The Atlantic Iron Works, Norfolk, Va., is planning to rebuild its machine shop and other departments, recently destroyed by fire with loss estimated in excess of $100,000, including equipment.

The Southern Power Co., Charlotte, N. C., is arranging for the immediate erection of a new hydroelectric generating plant in the vicinity of Mountain Island, Catawba River, with initial capacity of about 80,000 hp, estimated to cost in excess of $2,000,000, including generating equipment and transmission system. It is also completing plans for a hydroelectric power plant at Great Falls, N. C., with capacity of about 60,000 hp. to cost approximately $1,000,000.

The Palmetto Sheet Metal Works, P. O. Box 1, Florence, S. C., recently organized, has acquired a factory and will take immediate possession, specializing in the manufacture of roofing, skylights and general sheet metal products. B. G. Gregg is president and B. G. Gregg, Jr., secretary and general manager.

Pittsburgh

PITTSBURGH, March 20.

By far the largest individual crane order which has been placed in this district since the war, recently was closed. It calls for 21 cranes and a special trolley, the buyer being the Wheeling Steel Corporation, the entire order going to the Morgan Engineering Co., Alliance, Ohio. The award includes two 125-ton, 50-ft. span, double trolley, four-girder ladle cranes; one 30-ton with 10-ton auxiliary, 38-ft. 9-in. span, blooming engine room crane; one 30-ton with 10-ton auxiliary, 97-ft. 10 in. span, to serve the continuous mill; one 40-ton with 10-ton auxiliary, 84-ft. span to serve the blooming mill; one 20-ton with 5-ton auxiliary, 40-ft. span for the power house; two 25-ton with 10-ton auxiliary, 110-ft. span, for the slab yard; two 25-ton with 10-ton auxiliary, 75-ft. span, for the sheet bar yard and a special trolley, all for the Steubenville, Ohio, plant. (LaBelle Iron Works.) For the Portsmouth, Ohio, works, there is one 5-ton, 77-ft. span to serve the rod storage yard; one 5-ton, 88-ft. span for the galvanizing department; one 5-ton, 23-ft. 6-in. span for the nail mill; one 5-ton, 125-ft. span for the wire mill; one 5-ton, 72-ft. span for the annealing building; one 5-ton, 24-ft. span bucket crane for the gas house; one 15-ton, with 5-ton auxiliary, 42-ft. span for the sub-station and one 15-ton, with 5-ton auxiliary, 66-ft. 9-in. span for the rod mill. The order also includes one 5-ton 71-ft. span crane, one 7½-ton, 54-ft. span and one 5-ton, 42-ft. span, 4-motor overhead revolving type jib crane for the galvanizing plant at the Beach Bottom, W. Va., works. This order not only provides the Morgan Engineering Co. a substantial backlog, but means business for those providing parts not made by this company.

The crane market, aside from this business, shows much more life than in some time. The U. S. Sanitary Mfg. Co., Zelienople, Pa., has closed for two 5-ton cranes with the Northern Engineering Works, Detroit, which also has taken another order for a 2-ton hoist for the Pennsylvania Rubber Co., Jeannette, Pa. The Coshocton Iron Co., Monongahela City, Pa., has not yet acted on its recent inquiry for four cranes, but an award is expected shortly and also on a 110-ton crane for the new power plant of the West Penn Power Co., at Windsor, W. Va. For the latter plant the General Electric Co., recently was awarded two 30,000-kw. turbines and several boilers were placed with the Babcock & Wilcox Co. A 30,000-kw. turbine for the Springdale, Pa., plant was awarded the Westinghouse Electric & Mfg. Co. The John F. Casey Co., Union Arcade, Pittsburgh, has asked for bids on four 2-ton cranes and a 5-ton crane in connection with a sewage project in Ohio, on which it is bidding. The Pittsburgh Supply Co., 2 Ross Street, Pittsburgh, is inquiring for two 10-ton overhead cranes. Altogether there are 30 cranes in the active or semi-active stage. In addition, a large number will some time be wanted in connection with modernizing several of the plants of the Steel Corporation. Prices for estimating purposes have gone in against about 35 cranes and much rolling mill equipment. A number of other steel companies are figuring on the replacement of obsolete equipment.

The machine tool market is over-shadowed by the activity of cranes and other equipment. Business, as has been the case for months, is merely of a pickup character and with so much used or second-hand machinery available the trade does not look forward to much activity in new tools in the near future. Government war purchases still are bothersome and the failures in machinery using industries are bringing upon the market much equipment at prices which make a strong appeal to intending buyers. A case in point is the recent sale of the machinery of the Owens Magnetic Motor Car Co., Wilkes-Barre, Pa. It is currently stated that the bulk of these tools were taken by the Wheeling Steel Corporation for its new rod and wire mill at Portsmouth.

Ohio. Because of these purchases, among which were some machines which had not been uncrated, the list of that company, which originally called for 20 tools, has dwindled to two or three items. There is no sign of railroad buying in this district.

The Keystone Power Co., Kane, Pa., is arranging for enlargements in its electric plant, with the installation of two new generating units. One of the generators will be placed during the year, and the other early in 1923.

The Sharpsburg Foundry Co., Sharpsburg, Pa., is planning for the installation of a new cupola and other equipment.

J. C. Forster & Son, 2519 Penn Avenue, Pittsburgh, manufacturers of dies, tinware and other metal products, have awarded contract to R. E. Murray, 310 Iron Exchange Building, for a new two-story plant, 50 x 100 ft., estimated to cost about $42,000.

A one-story electrically-operated pumping plant will be constructed by the Board of Water and Light Commissioners, Tarentum, Pa., for the municipal waterworks.

The Ray-Burdette Coal Co., Delaware and Hall streets, Charleston, W. Va., is planning for the installation of a new gas engine and other power equipment at its works.

The City Council, Parkersburg, W. Va., will soon call a special election to vote bonds for $300,000 for the erection of a new high school with vocational department. The Board of Education is in charge.

The Young Brothers Foundry Co., Charleston, W. Va., recently organized, has plans under way for the erection of a one-story foundry to manufacture iron and steel castings. R. M. and Walter Young, Charleston, head the company.

The Lunsdale Coal Co., Lunsdale, W. V., has preliminary plans under way for a new tipple at its properties at Three Forks. It will also install considerable electrical and mining machinery in different departments of the plant. The entire project is estimated to cost close to $1,000,000. George M. Jones is general manager.

A vacational department will be installed in the high school to be erected by the School Board, Hundred, W. Va., for which bonds for $75,000 have been voted.

The Wheeling Machine Products Co., 1920 Main Street, Wheeling, W. Va., is arranging for the installation of a new power plant.

The Pennsylvania-Ohio Power & Light Co., Sharon, Pa., is planning for the installation of equipment at its new power house addition at Lowellville. It is expected to have the plant unit ready for operation late in May.

The Board of Education, McKeesport, Pa., has approved plans for an addition to the technical and vocational high school to cost about $300,000. T. B. and Lawrence Wolfe, Century Building, Pittsburgh, are architects.

St. Louis

ST. LOUIS, March 20.

The Union Electric Light & Power Co., St. Louis, has acquired fifty acres of land on the Illinois side of the Mississippi River immediately south of the city limits of East St. Louis, Ill., as a site for a power plant to supply the rapidly increasing demands for electrical energy in St. Louis and environs. Much of the present power is received from the large water power plant of the Mississippi River Power Co. at Keokuk, Iowa, and from the company's own Ashley Street steam power plant. The cost of the power plant and equipment will be upward of $6,000,000. McClellan & Junkersfeld, 45 William Street, New York, have been engaged as engineers.

The Hall & Brown Woodworking Machinery Co., 1913-33 North Broadway, St. Louis, is planning to call for bids early in April, for the erection of an addition to cost about $50,000.

The Press Sign Co., 202 South Seventeenth Street, St. Louis, manufacturer of metal signs, has arranged with the Modoc Realty Co., St. Louis, for the erection of a new two-story plant, 120 x 125 ft., estimated to cost about $35,000, to be occupied under lease.

The Carbur-Aid Garage & Machine Co., Poplar Bluff, Mo., is planning for the erection of a new two-story machine works addition, estimated to cost about $40,000.

The St. Louis & San Francisco Railroad Co., St. Louis, is perfecting plans for the enlargement of its locomotive shops at Springfield, Mo., to include the installation of new machine tools and other equipment, estimated to cost about $200,000.

The Lecoutour Brothers Stair Mfg. Co., 4523 Shaw Avenue, St. Louis, has plans under way for rebuilding its two-story factory, recently damaged by fire, to cost about $50,000. New equipment will be installed. Emil H. Nieman, 3816 Shaw Avenue, is architect.

The Chicago, Rock Island & Pacific Railroad Co., La Salle Street Station, Chicago, has plans in progress for new locomotive repair works at Little Rock, Ark., estimated to cost about $250,000, including machinery. C. A. Morse is chief engineer.

Fire, March 6, destroyed a portion of the plant of the Kanok Metal Co., Crestline, Kan., with loss estimated at $45,000, including equipment.

A vocational department will be installed in the two-story high school to be erected at Thomas, Okla., estimated to cost about $70,000. A. J. Love & Co., 205 Richards Building, Tulsa, Okla., are architects.

The Muskogee Refining Co., Muskogee, Okla., is planning for extensions in its oil refinery on South Cherokee Street to cost about $250,000, including equipment.

The American Public Service Co., Okmulgee, Okla., is disposing of a bond issue of $1,000,000, a portion of the proceeds to be used for extensions and improvements in electric plants and system.

The Charleston Mining & Mfg. Co., Charleston, S. C., is planning to rebuild its grinding plant at Mt. Pleasant, Tenn., recently destroyed by fire with loss estimated at $150,000, including equipment.

The City Council, Fulton, Mo., has plans in progress for the installation of additional machinery at the municipal electric light and power plant.

The Harlan County Motor Co., Harlan, Ky., will call for bids at an early date for the erection of a new one-story branch machine shop and service building at Lynch, Ky. R. P. McGeckin, Lynch, is architect.

The Wilhoit Oil Co., Webb City, Mo., is planning to rebuild the portion of its refinery destroyed by fire March 13, with loss estimated at close to $75,000.

The Triangle Machine Works, Central City, Ky., has completed plans for a new two-story and basement factory, 75 x 100 ft., estimated to cost approximately $30,000. W. B. Mix is head.

The Carbon Coal Co., Jackson, Ky., recently organized with a capital of $120,000, is planning for the construction of an electric power plant at its local properties. It will also install considerable equipment for operating the mines, including motors, shaker screens, etc. Emory Cain is president and general manager.

The Kansas Gas & Electric Co., Topeka, Kan., has arranged for a bond issue of $3,000,000, a portion of the proceeds to be used for extensions and improvements in power plants and system. Preliminary plans are under way for the installation of new generating equipment and extensions in other power departments and distributing system. F. G. Sykes is vice-president.

The Standard Oil Co. of Kentucky, Louisville, has called a special meeting April 3 to approve an increase in its capital from $6,000,000 to $12,000,000, a portion of the proceeds to be used for extensions in its oil refineries and mechanical plants. C. T. Collings is chairman of the board.

Detroit

DETROIT, March 20.

The Barton Auto Top Co., 4445 Woodward Avenue, Detroit, is completing plans for a new three-story factory, 62 x 160 ft., at 60 West Canfield Avenue, estimated to cost $50,000. Albert Barton is president.

The Cartwright Die & Tool Co., 2962 Hart Avenue, Detroit, is planning for the installation of new die-manufacturing and other equipment at its plant.

The Stearns & Niles Co., Detroit, is arranging facilities to provide for the manufacture of the Knight superheater for automobiles.

A complete machine shop and manual training building will be erected by the Board of Education, Saginaw, Mich., in connection with a new junior high school in the East Side section, estimated to cost about $1,200,000. Henry Witters is president of the board.

The Precision Tool Co., 5465 Lincoln Avenue, Detroit, is planning for the installation of new bench tools and machine shop equipment at its plant.

The Michigan Porcelain Tile Works, Ionia, Mich., has been organized with a capital of $100,000 to construct a factory for the manufacture of tile products. Plans have been drawn for a one-story and basement works, 120 x 160 ft., estimated to cost about $50,000, with machinery. Harry E. Kidder is general manager. P. Lindhout, fifth floor, Michigan Trust Building, Grand Rapids, Mich., is architect.

A vocational department will be installed in the two-story and basement high school, 95 x 130 ft., to be erected at Grosse Isle, Mich., to cost about $80,000. Malcomson, Higginbotham & Palmer, 404 Moffat Building, Detroit, are architects.

The Detroit Edison Co., Detroit, has arranged for a cap-

ital stock issue to provide in part for the proposed expenditures for plant extensions and improvements, estimated at close to $3,000,000. The work will include the installation of new generating and line equipment, with auxiliary operating machinery. Alexander Dow is president.

The Michigan Tool Co., 402 East Jefferson Avenue, Detroit, will soon begin construction of a new factory at Mack Avenue and the Detroit Terminal Railroad.

Milwaukee

MILWAUKEE, March 20.

Business the past week was not much, if any, above the average of the last four to six weeks, but inquiries were more numerous, particularly from the automotive and farm equipment industries. The latter trade is just entering a new epoch of production, although it probably will require some time to wipe out surplus stores. Passenger automobile trade is active once more. Railroad buying is increasing slowly and some business was placed during the week in this line. Manufacturers of steam and hydroelectric generating equipment, who are at present engaged in executing some large orders, have considerable new business in sight. Other divisions of the metal-working industries are also moving steadily into a stronger position.

The Ironwood & Bessemer Railway Co., with headquarters at Ashland, Wis., has been granted authority to issue $233,000 of preferred stock for additions and extensions to its property and plant. The major expansion will be made at the steam generating plant on the Chequamegon Bay front in Ashland. Details, however, will not be available until later.

The S. W. Miller Piano Co., Sheboygan, Wis., has been obliged to abandon temporarily its plan of erecting a new factory and warehouse, its site having been condemned by the city for park and bathing beach extensions. The company, however, has purchased the American theater building, which it will remodel for occupancy May 15 as a temporary factory. It is seeking another site upon which to carry out its original new plant construction project. W. H. Ackerman is treasurer and general manager.

The Franklin Motor Car Co., Syracuse, N. Y., has addressed an inquiry to the Milwaukee Association of Commerce with reference to the proposed establishment of a new factory estimated to cost $1,000,000. A similar inquiry has been received from the Halladay Motor Corporation of Newark, N. J. Two manufacturers of power farm machinery, whose identities are not divulged, are negotiating with the new industries division of the Association of Commerce for suitable buildings or sites for new buildings.

The Wisconsin Castings Co., Sheboygan, Wis., has been incorporated with a capital stock of $125,000 by Harry W. Bolens of Port Washington, Wis., who recently bid in the property of the Globe Metal Products Co., founder and machinist, Sheboygan, at receiver's sale for $65,800. Mr. Bolens is president and general manager of the Gilson Mfg. Co., Port Washington, and several other metalworking industries, specializing in the manufacture of gas engines and farm operating equipment. The plant of the former Globe company consists of a gray iron foundry and machine shop erected about two years ago. Mr. Bolens intends to place both shops in operation at once.

The S. Heller Elevator Co., 250 Milwaukee Street, Milwaukee, has plans for a new four-story factory to be erected at a cost of $75,000 to $100,000 at Milwaukee and Buffalo streets. It manufactures electric, hydraulic and manual freight and passenger elevators. Work will begin about April 1. Siegfried Heller is president and treasurer.

The Milwaukee Boiled Ham Co., 901 Holton Street, Milwaukee, will build a new packing plant, with cold storage and warehouse, at Weil Street and Garfield Avenue, at a cost of about $50,000. Inquiry is being made for engines, boilers, ice machine, etc. John J. Czala is general manager.

The Ashland Light & Power Co., Ashland, Wis., has placed the general contract with the L. E. Meyers Co., 53 West Jackson Boulevard, Chicago, consulting and contracting engineer, for the construction and equipment of a new hydroelectric generating plant costing $3,500,000 on the Flambeau River near Tony, in Rusk County, Wis. The principal items of equipment will be three 5000-hp. turbo-generating units. Approximately 105 miles of transmission lines will be constructed.

Harry A. White, Marinette, Wis., has engaged Theodore Klayer, Jr., architect, 1861 Dunlap Avenue, local, to prepare plans for a garage and service station, 118 x 120 ft., one story and basement, estimated to cost $30,000, including equipment, etc.

The Bucyrus Co., South Milwaukee, Wis., has awarded the general contract to Paul Riesen's Sons Co., 1018 Humboldt Avenue, Milwaukee, for a new gray iron foundry, 60 x 276 ft., of brick and steel. It also will build a new machine and erecting shop at its plant in Evansville, Ind., contract for which has been let to the Worden-Allen Co.

The Madison Gas & Electric Co., Madison, Wis., will take bids within a few days for an addition to its steam generating plant to produce 5000 kw. additional energy. The work is in charge of Mead & Seastone, consulting engineers, Madison. Equipment requirements include a 1000-hp. Sterling boiler, automatic stoking equipment, coal handling machinery, bunkers, etc.

The Chippewa Valley Auto Co., Chippewa Falls, Wis., has plans for a new public garage, sales and service building, 100 x 200 ft., estimated to cost $75,000 complete. Fred A. Bigler is president and general manager.

The R. J. Schwab & Sons Co., 283 Clinton Street, Milwaukee, iron founder and manufacturer of furnaces, boilers, etc., will erect two brick additions, 30 x 72 and 40 x 50 ft., to provide larger production capacity.

The Board of Education, Ashland, Wis., is taking bids until April 10 for a manual arts building as an addition to the central high school. It will be 65 x 100 ft., three stories and basement, and with full equipment will cost about $130,000. The architects are Kelley & Schefnick.

The Domestic Foundry Co., North Milwaukee, Wis., has been incorporated with a capital stock of $10,000 to manufacture gray iron castings. The incorporators are John Toennessen, J. L. Orth, H. W. Connell and Martin Schottler, 105 Wells Street, Milwaukee, attorney. A statement concerning the company's plans will be made later.

The American Steel Corporation, Milwaukee, has filed articles of incorporation to manufacture iron and steel products. The capital stock is $100,000. The incorporators are A. J. Vollbrecht, George A. Affeldt, attorney, and B. Glenn Tarkington, 740 Thirty-third Street, sales manager Pittsburgh Furnace Co. The incorporators expect to be ready soon to detail plans of the enterprise.

The Gulf States

BIRMINGHAM, March 20.

The Continental Box Corporation, Brewton, Ala., has acquired the local plant of the T. R. Miller Mill Co., specializing in the manufacture of wire-bound boxes, and will operate the factory. Extensions and improvements are planned.

E. J. Owen, Sixth Street, Gadsden, Ala., has preliminary plans under way for a new one-story foundry to manufacture iron and other metal castings.

The American Public Service Co., Baird, Tex., will build a new cold storage plant, estimated to cost about $75,000.

The Robstown Gin & Ice Co., Robston, Tex., will install a new generator and other equipment at its power house. The company is arranging to electrify its cotton ginning branch and will install motors and other electrical apparatus. Extensions and improvements will also be made in the local cold storage plant.

The City Council, Fernandina, Fla., has called a special election on April 4 to vote bonds for $37,000 for extensions and improvements in the municipal electric light and ice plant. New equipment will be installed.

The Brooks Supply Co., 799 Franklin Street, Beaumont, Tex., manufacturer of oil well supplies and equipment, is planning the erection of a one-story machine shop addition. A number of machine tools will be installed.

The Humphreys Oil Co., Mexia, Tex., is being formed by a merger of the Humphreys-Texas Co., and the Humphreys-Mexia Co. It will have a capital of $15,000,000 and plans extensive operations. A new refinery will be erected at a Gulf point, with pipe line, now in course of installation, from the Mexia field. The entire project will cost approximately $1,000,000. Col. A. E. Humphreys is president.

The Common Council, Delray, Fla., will commence the immediate construction of a one-story municipal electric lighting plant.

The Fluker Gravel Co., 203 Roumain Building, Baton Rouge, La., recently organized with a capital of $100,000, will equip a new sand and gravel working plant in the vicinity of Fluker, La. The installation will include drag lines, buckets, two complete washing plants, cars, electrical and other equipment. O. O. Ogden is president and general manager.

The Common Council, Paris, Tex., will build an electrically operated pumping and filtration plant in connection with a new waterworks system. Bonds for $1,000,000 have been sold. Major J. B. Hawley, Fort Worth, Tex., consulting engineer, has plans.

The Houston Electric Co., Houston, Tex., is planning for the purchase of 35 new street cars and other operating equipment, estimated to cost about $275,000.

The Common Council, Clearwater, Fla., is arranging for the erection of a municipal electric light and power plant.

The ice-manufacturing plant of the Sabine Ice Co., Bronson, Tex., with cotton gin adjoining, has been acquired by J. O. Sparks and E. Cousins, Bronson. The new owners will make additions and improvements and install new equipment. Plans are also being considered for the establishment of an electric power house.

Copeland Brothers, Tuscaloosa, Ala., have acquired timber lands in the vicinity of McSham, Ala., and have plans under way for a new saw mill, planing mill and other buildings, estimated to cost in excess of $50,000.

A vocational department will be installed in the new high school to be erected at Greenville, Tex., estimated to cost about $100,000. Bonds have been voted.

The Cantonment Merchantile Co., Cantonment, Fla., will build a new ice-manufacturing and refrigerating plant in connection with its canning factory. H. R. Root is secretary and treasurer.

Indiana

INDIANAPOLIS, March 20.

A vocational department will be installed in the two-story and basement high school to be erected at Cannelton, Ind., estimated to cost about $65,000. Breston Minor is secretary.

The Northern Indiana Gas & Electric Co., South Bend, Ind., has secured permission to purchase the plant and property of the Lafayette Service Co., Lafayette, Ind., at a chancery sale for $120,000. The new owner plans extensions and improvements in the power plant and system.

The D. V. Reedy Elevator Co., Indianapolis, manufacturer of passenger elevators, will soon commence the erection of the superstructure for its new two-story plant on South New Jersey Street, estimated to cost close to $50,000, including machinery. D. V. Reedy is president.

A vocational department will be installed in the two-story and basement high school to be erected by the Franklin School Township Board, Georgetown, Ind., at Lanesville, Ind., estimated to cost $80,000. George C. Doolittle, Corydon, Ind., is architect.

The J. H. Kripke Co., 512 West Franklin Street, Evansville, Ind., is planning for the erection of a metal and iron-working shop on West Franklin Street, to cost about $25,000.

Motors and other electrical and mechanical power equipment will be installed in the new printing plant to be erected by the R. R. Donnelly Co., 731 Plymouth Court, Chicago, at Crawfordsville, Ind., to cost about $275,000.

A vocational department will be installed in the two-story and basement high school to be erected at Albion, Ind., estimated to cost $75,000.

The Elwood Foundry, Elwood, Ind., has been sold by the trustee in bankruptcy to Abe Levi, Elwood, for $6,500. A new company is being organized to operate the foundry, which will make traffic signs and other devices for which the former concern had contracts. Clayton Cooper is interested.

The new foundry of the C & G Potts Co., 816 Washington Avenue, Indianapolis, has been completed at a cost of $60,000. It is 90 x 145 ft., of brick and steel, part two-stories, and will have an output of 18 to 20 tons of gray iron and semi-steel castings a day.

The Pacific Coast

SAN FRANCISCO, March 14.

The Armstrong Brothers Tool Co., 335 North Francisco Avenue, Chicago, has acquired water front property at Astoria, Ore., as a site for a new plant for Pacific Coast and Far Eastern trade. It is planned to commence erection late in the spring.

The Long Beach Crystal Ice Co., Long Beach, Cal., recently organized with a capital of $100,000, has plans nearing completion for a new factory at 2870 American Avenue, Willowville, estimated to cost $60,000, including machinery.

The Board of Public Works, Municipal Building, San Francisco, will call for bids in April for the proposed municipal hydroelectric power plant at Moccash Creek, estimated to cost about $1,000,000, with machinery.

W. E. Higman and H. B. Mason, Atascadero, Cal., have organized a company and are completing plans for a new cold storage and refrigerating plant, 100 x 200 ft., estimated to cost $200,000 with equipment.

A manual training and domestic science building will be erected by the Board of Education, Calipatria, Cal., in connection with a new group of high school buildings, estimated to cost in excess of $150,000. Donald E. Wells, El Centro, Cal., is architect.

A vocational department will be installed in the new high school to be erected at Corona, Cal., for which $150,000 in bonds have just been voted. Plans will be prepared at once.

The Great Western Power Co., 14 Sansome Street, San Francisco, will commence the immediate erection of a new two-story power house at El Cerrito, Contra Costa County, estimated to cost about $150,000.

The Ever-Ready Heater Co., Inglewood, Cal., recently organized with capital of $500,000 to manufacture heaters and heating equipment, has acquired about five acres of land near the plant of the Hicks Dovetail Lath Co., and plans the erection of a new factory. John B. Reeves is president.

The Pacific Power & Light Co., Portland, Ore., is considering plans for the erection of a new hydroelectric generating plant on the Deschutes River, with initial capacity of about 30,000 hp. Guy W. Talbot is president.

Canada

TORONTO, March 20.

Both manufacturers and dealers report a decided improvement in the demand for machinery and tools. Many manufacturers have recently increased operating capacity and are producing on a larger scale than at any time during the past year and a half. Dealers' orders are mostly for one or two machines, with an occasional order for six or a dozen tools. Buying has not yet started on an extensive scale, but there is a steadily increasing number of users who are entering the market for machines for replacemnt purposes. In Montreal, where business has been very dull for the past year or more the demand for equipment is showing improvement and sales of various lines of machinery are slowly picking up. Small tools continue active.

The Board of Education, Guelph, Ont., is receiving bids for the erection of a collegiate institute which will contain woodworking and machine shops, electrical department, etc.

The Toronto Transportation Commission, Toronto, will build a machine shop in Hillcrest Park at an estimated cost of $100,000. Equipment has not yet been purchased. It is also receiving bids for 8000 tons of steel rails.

The Standard Stone Co., Windsor, Ont., will erect a factory and install the necessary machinery.

The governors of the General Hospital, Brantford, Ont., are contemplating equipping an auxiliary power plant to provide against storms, etc.

The Northern Ontario Light & Power Co., Cobalt, Ont., is considering the development of 7000 hp. at Sturgeon Falls, Ont., to cost between $350,000 and $600,000.

N. K. Lund, Forestburg, Alta., is making arrangements for the erection of electric lighting plant.

The Red Star Refineries, Ltd., Montreal, recently incorporated, is preparing to erect an oil refinery and has secured a site in the east end of the city with railroad and harbor facilities and is ready to proceed with the erection of the first unit with capacity of 1000 bbl. per day. It will ultimately have a daily capacity of 10,0000 bbl. The President of the company is Senator N. A. Belcourt, Ottawa, Ont.; vice-president and general manager, T. A. Hilburn, and the directors include F. W. Stewart, H. W. Austin, J. S. Stanford, J. McNaughton and J. S. Giles.

The Kasutine Co., Ltd., formerly of 28 Eastern Avenue, Toronto, has moved to Dundas, Ont., where it has acquired control of the Dominion Welding Products Co. The latter company commenced manufacturing steel tanks for water, gasoline and storage as well as welded smoke stacks last July.

The Enterprise Foundry Co., Sackville, N. B., has recently completed an addition, 50 x 150 ft., for making bodies for steel and gas ranges and a wing, 30 x 50 ft., for japanning. A new development at the plant is the installation of a large air compressor for sand blasting and other foundry work.

The chairman of the Hydro Commission, 75 Laurier Avenue, Ottawa, Ont., is receiving bids for meters, transformers, wire and general supplies. J. E. Brown is manager.

The Fedders Mfg. Co., Black Rock, N. Y., has purchased the plant of the Lantz Marble Works on Lewis Street, Bridgeburg, Ont., and will equip it to manufacture automobile radiators, aeroplane accessories, etc.

The Canadian Automobile Corporation, 197 Sparks Street, Ottawa, has started work on the erection of a factory in West Hull Township to cost $50,000. Charles A. Fox, 294 Harvard Street, Montreal, is architect.

The Manitoba Rolling Mill Co., Winnipeg, Man., is in the market for a 36-in. lifting magnet for handling scrap; also a 100,000-lb. testing machine.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined iron bars, base price	2.53c.
Swedish bars, base price	10.00c.
Soft steel bars, base price	2.53c.
Hoops, base price	3.38c.
Bands, base price	3.13c.
Beams and channels, angles and tees 3 in. x ¼ in. and larger, base	2.63c.
Channels, angles and tees under 3 in. x ¼ in., base	2.53c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	2.50c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	2.70c.
Toe-calk, ½ x ⅜ in. and larger	3.20c.
Cold-rolled strip, soft and quarter hard	6.25c. to 7.25c.
Open-hearth spring steel	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds	3.35c.
Squares, flats and hex	3.85c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¼ in. and heavier	2.63c.

Sheets

Blue Annealed

	Per Lb.
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.55c. to 3.80c.	.....
Nos. 22 and 24	3.60c. to 3.85c.	4.10c.
No. 26	3.65c. to 3.90c.	4.15c.
No. 28	3.75c. to 4.00c.	4.25c.
No. 30	4.00c. to 4.25c.	.....

No. 28 and lighter, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	3.85c. to 4.10c.
No. 16	4.00c. to 4.25c.
Nos. 18 and 20	4.15c. to 4.40c.
Nos. 22 and 24	4.30c. to 4.55c.
No. 26	4.45c. to 4.70c.
No. 27	4.60c. to 4.85c.
No. 28	4.75c. to 5.00c.
No. 30	5.25c. to 5.50c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel	Black	Galv.	*Wrought Iron*	Black	Galv.
½ in. Butt	—56	—40	¾ in. Butt	—30	—13
¾ in. Butt	—61	—47	1½ in. Butt	—32	—15
1-3 in. Butt	—63	—49	2 in. Lap	—27	—10
3½-6 in. Lap	—60	—46	2½-6 in. Lap	—30	—15
7-8 in. Lap	—56	—34	7-12 in. Lap	—23	— 7
9-12 in. Lap	—55	—33			

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER	Per Lb.
Bright basic	3.50c. to 3.75c.
Annealed soft	3.50c. to 3.75c.
Galvanized annealed	4.25c. to 4.50c.
Coppered basic	4.00c. to 4.25c.
Tinned soft Bessemer	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	16¾c. to 17 c.
High brass wire	17 c. to 17¼c.
Brass rod	14¼c. to 14½c.
Brass tube, brazed	26 c. to 27½c.
Brass tube, seamless	18½c. to 19 c.
Copper tube, seamless	20¾c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 19½c. to 20½c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin Grade "AAA" Charcoal 14x20	Bright Tin Grade "A" Charcoal 14x20	Coke—14-20	Primes	Wasters
		80 lb.	$6.05	$5.80
		90 lb.	6.15	5.90
		100 lb.	6.25	6.00
IC	$10.00	IC	6.40	6.15
IX	11.50	IX	7.40	7.15
IXX	13.00	IXX	8.40	8.15
IXXX	14.25	IXXX	9.40	9.15
IXXXX	16.00	IXXXX	10.40	10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.	$7.00
IC	7.25
IX	7.50
Fire door stock	9.00

Tin

Straits, pig	32c.
Bar	37c. to 42c.

Copper

Lake ingot	15 c.
Electrolytic	14¾c.
Casting	14½c.

Spelter and Sheet Zinc

Western spelter	6½c. to 7c.
Sheet zinc, No. 9 base, casks	10½c. open 11c.

Lead and Solder*

American pig lead	5¾c. to 6¼c.
Bar lead	6¾c. to 7 c.
Solder, ½ and ½ guaranteed	23c.
No. 1 solder	21c.
Refined solder	17c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c.
Grade D, per lb.	25c.

Antimony

Asiatic	5¾c. to 6c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	25c. to 27c.

Old Metals

The market continues fairly firm, with an upward tendency. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	10.75
Copper, heavy wire	9.75
Copper, light and bottoms	8.00
Brass, heavy	5.00
Brass, light	4.50
Heavy machine composition	7.75
No. 1 yellow brass turnings	5.25
No. 1 red brass or composition turnings	6.75
Lead, heavy	3.75
Lead, tea	2.50
Zinc	2.50